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Patentability of AI-generated Inventions and their Impact on market Competition: An Analysis Considering the Legal Perspective of Australia, Europe and the USA

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Abstract

Artificial Intelligence (AI) machines, if trained substantially, are capable of inventing new products. In recent time, an issue has been raised globally as to whether AI-generated inventions should be granted patent. For training the artificial intelligence machines enough to be capable of inventing something noble, vast amount of data is required. In the present world of information technology, data have become a crucial commodity, and they have created a link between AI-generated inventions and market competition. This has given birth to another question as to whether these inventions can affect fair competition in the market, and if so, how the impacts can be remedied. The prime objective of this paper is to find out whether granting patent to AI-generated inventions contradicts with normative and doctrinal principles of patent regime. While proceeding with the issue, the paper will discuss how the created database to train AI can provide huge market power to few companies and can create a competition problem as well as what can be the potential remedies for these problems. For achieving the goal, the paper will discuss the concerned legislative provisions, case laws and executive decisions of three major global jurisdictions, i.e., Australia, Europe, and the USA. It argues that AI-generated inventions are contradictory to the patent regimes, they can negatively affect fair competition, and hence they should not be granted patent.

Keywords: *Intellectual property law, Patent law and AI, Market competition and AI, Patentable Inventions, Patentability of Ai-generated inventions*

1. Introduction

The issues of intellectual property rarely emerge from emptiness, rather they stem from real world challenges and usually involve innovative solutions.[1] To mitigate the challenges thrown by information industry, intellectual property rights are required to be

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[1] Sam Ricketson and others, *Intellectual Property: Cases, Materials and Commentary* (6th edn, LexisNexis Butterworths 2020) 3.

considered in a new way.[2] There has been remarkable progress in the field of information technology over the past two decades, which has led to an unprecedented level of innovation in various industries, resulting in the development of new and improved products and services.[3] One of those remarkable progresses is the evolution of artificial intelligence in the field of industry, and if trained with substantial amount of data, they are capable of inventing new products. This technological progress has thrown a challenge to intellectual property regime regarding the protection of these inventions. This technological progress has created a dilemma in intellectual property regime. On one hand, it is argued that the materials created by these artificial intelligent machines should get protection under intellectual property regime as they would get if made by human beings. The contrasting argument is that they should not get protection because the terms authorship and inventorship are only applicable to human beings. This paper proposes that the protection of intellectual property regime is not for these inventions. In doing so, the paper will analyse the normative and doctrinal aspects of intellectual property regimes of Australia, Europe and the United States of America and will try to find out whether the regimes have left any scope to accommodate these inventions.

Moreover, patent law and competition law have an intense relationship, where the former deals with pre-production formalities and the later deals with the matters that arise after the products reach the market.[4] New linkages are witnessed between these two sets of laws in the present world.[5] As the two regimes are inter-related, this paper will also discuss the AI-generated inventions in competition law perspective.

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[2] John H Barton, 'The Balance between Intellectual Property Rights and Competition: Paradigms in the Information Sector' (1997) *7* European Competition Law Review 440.

[3] Emna Chikhaoui and Saghir Mehar, 'Artificial Intelligence (AI) Collides with Patent Law' (2020) 23(2*) Journal of Legal, Ethical and Regulatory* Issues 1.

[4] Francesca Mazzi, 'Patentability of AI Generated Drugs' (2020) 4(1) *European Pharmaceutical Law Review* (EPLR) 27.

[5] Barton (n 2).

The analysis of this paper is structured into three principal parts. Part I introduces the core subject matter and the foundational legal context. Part II critically examines the patentability of AI-generated inventions. This section begins by defining the scope of both patentable subject matter and AI-generated inventions. It then delves into the contentious issue of AI inventorship, analyzing whether an AI system can be legally designated as an inventor under current patent regimes. This analysis is grounded in a theoretical framework, incorporating established intellectual property theories and ethical considerations. For each contested issue, the paper advances a clear, evidence-based argument to support its central thesis. Part III investigates the potential market impacts of inventions generated by AI. This section establishes a direct link between AI-generated inventions and the strategic accumulation of data, discussing how this concentration may facilitate various forms of anti-competitive practices. The paper concludes by proposing and evaluating specific remedial measures designed to mitigate the identified anti-competitive concerns.

2. Patentability of AI-Generated Inventions

Computers are capable of creating contents in a manner that they are qualifying to be considered as inventors.[6] In other words, computers have become so sophisticated that they can create contents without human intervention. These contents, if made by human, would have been considered patentable inventions. Computers can also be used by human inventors as a mere tool to invent something which is not a problem of patent regime.[7] So, this type of inventions is out of context of the present research. The paper focuses on the inventions that are made by a computer independently. This capability of computers to invent new things independently puts a challenge to the established standard of

[6] Ryan Abbott, 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law' (2016) 57(4) *Boston College Law Review* 1080.

[7] Chris Holder and others, 'Robotics and Law: Key Legal and Regulatory Implications of the Robotics Age (Part II of II)' (2016) (32)4 *Computer Law & Security Review* para 7.5.

patentability.[8] This part will try to define AI-generated inventions and will discuss what inventions are patentable under patent law regime. It will discuss whether AI-generated inventions are consistent with the doctrine of inventorship and other legislative provisions of Australia, Europe and the United States of America.

2.1. AI-generated Inventions

AI has been generating inventive products for several decades and the persistent development in computing efficiency has made it a key factor in economic progress.[9] For clarifying AI-generated inventive products, we need to look what artificial intelligence is.[10] However, there is no conclusive definition of artificial intelligence.[11] The term 'artificial intelligence' was invented by Alan Turing who is famous for decoding Nazi German cipher machine Enigma during the second world war.[12] Artificial Intelligence is a human-developed system that functions in the corporeal or virtual realm and achieves a given complex goal by discerning the circumstances, understanding the provided data, and determining the best steps.[13] In other words, this system is developed by human and can evaluate the data given to it. By evaluating the provided data, it can autonomously complete any given task. When this system uses the data for its learning and autonomously makes something new, the outcome can be called AI-generated invention.

2.2. *Patentable Inventions*

According to Australian patent law, an invention is patentable if it is a manner of manufacture, it is new, it involves an inventive step and

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[8] Abbott (n 6) 1080.

[9] *Ibid* 1079.

[10] Daria Kim, 'AI-generated Inventions: Time to Get the Record Straight?' (2020) 69(5) *GRUR International* 443, 444.

[11] Tabrez Y. Ebrahim, 'Data-Centric Technologies: Patent and Copyright Doctrinal Disruptions' (2019) 43(3) *Nova Law Review* 287, 294.

[12] Stuart J Russel and Peter Norvig, *Artificial Intelligence: A Modern Approach* (3rd edn, Pearson 2015) 5.

[13] Maurice Schellekens, 'Artificial Intelligence and the Re-Imagination of Inventive Step' (2022) 13(2) *Journal of Intellectual Property*, Information Technology and Electronic Commerce Law 89, 90.

has utility.[14] This Act defines invention as a manner of manufacture.[15] Patents legislation of the UK denotes that patent may be granted to an invention if it is new, involves an inventive step and has industrial application.[16] It is clear in these legislations that any invention that is a manner of manufacture, new, that involves an inventive step and has some real use can be granted patent. However, neither of these legislations give a clear and conclusive definition of 'invention' or 'manner of manufacture'. According to the US patent law, whoever invents or discovers any new and useful thing, may obtain a patent.[17] This Act defines invention as any type of invention or discovery.[18] This legislation also remains silent in defining 'invention'.

While defining manner of manufacture, High Court of Australia observed that the invention may be a product or may be a process, but it is required to be something that is a result of human action.[19] The United States Supreme Court defined patentable invention as anything which is made by human being.[20] Considering these decisions, it can be said that any human-made product or process is potentially an invention, and it is patentable if it qualifies other criteria.

2.3. *Can Artificial Intelligence be Considered as Inventors?*

The disclosure of an inventor as a natural person in the patent applications is required in most jurisdictions, which is aimed to recognise the rights of human inventors.[21] However, the inclusion of AI machines in the process of inventions has raised a doctrinal issue of patent law which assumes human beings as the inventors.[22]

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[14] Patents Act 1990 (Australia) s 18(1)(a).
[15] *Ibid*, Sch 1.
[16] *Ibid*, (UK) s 1(1).
[17] 35 USC § 101.
[18] *Ibid*. § 100.
[19] *D'Arcy v Myriad Genetics Inc* (2015) HCA (Australia) 35, 6.
[20] *Diamond, Commissioner of Patents and Trademarks v Chakrabarty* 447 U.S. 303 (1980).
[21] Rayan Abbott, 'The Artificial Inventor Project' (2019) 6 WIPO Magazine.
[22] Tabrez (n 11) 307.

According to Australian patent legislation, a patent can be granted to a person who is the inventor, or who is entitled to be assigned to the invention, or who derives title to the invention from the inventor, or who is the predecessor in title of the aforementioned persons.[23] This provision is organised in such a way that indicates that patent can be granted to the inventor or to any other person who receives the entitlement of the invention from the inventor.[24] So, it can be said that the inventor remains at the centre point of the legislation regarding grant of patent. The Australian Patents Act does not define inventor however, the Federal Court of Australia - Full Court determined that an inventor is whoever devises the invention.[25] As mentioned in the previous section, High Court of Australia observed that the invention is required to be something that is a result of human action.[26] It means that the inventor must be a human being under established Australian legal principles.

While construing the concerned provision of the UK patent law, the Court of Appeal observed that the section 7(2) of the said law has three sub-classes, namely, the inventor, any person who was at the time of the making of the invention became entitled to the property in it, and successors in title to the aforementioned persons.[27] The UK Patents Act defines inventor as the actual deviser of the invention.[28] The same Act provides that the inventor has a right to be mentioned in any granted patent and patent application[29]. Identical provision can be found in the Paris Convention for the Protection of Industrial Property which says that 'The inventor shall have the right to be mentioned as such in the patent'.[30] The right mentioned in the UK Patents Act and in the Paris Convention is a moral right and only a

[23] Patents Act 1990 (Australia) s 15(1).
[24] *JMVB Enterprises Pty Ltd v Camoflag Pty Ltd* (2006) FCAFC (Australia) 141, 71.
[25] ibid.
[26] *D'Arcy* (n 19) 6.
[27] *Thaler v Comptroller General of Patents, Trademarks and Designs* [2021] EWCA Civ 1374 (UK), para 11.
[28] Patents Act 1977 (UK) s 7(3).
[29] Patents Act 1977 (UK) s 13(1).
[30] *Paris Convention for the Protection of Industrial Property*, opened for signature 20 March 1883, 828 UNTS 305 (entered into force 7 July 1884), art 4[ter].

person can have moral rights which means that inventor must be a person.[31] Moreover, the House of Lords has taken the actual deviser of the invention to be a natural person.[32]

Furthermore, section 2(4) of the UK Patents Act is related to the prior art disclosures that do not affect the novelty of the invention. It provides that if the prior disclosure made by a person who obtained the information from the inventor with confidentiality, then the disclosure will not affect the novelty of the invention.[33] It is clear from the reference to the 'inventor' in section 2(4) of the UK Patents Act that the inventor must be a person.[34] Because, machines cannot disclose anything with the burden of confidentiality. So, the UK Patents Act does not allow an AI to be the inventor, because AI cannot create any confidentiality.

The United States patents legislation defines the term 'inventor' as the individual who invented the subject matter of the invention.[35] It provides that an application for patent to be made or authorized to be made by the inventor.[36] This legislation requires the name of the inventor to be mentioned in the patent application.[37] It also requires the inventor to execute an oath or declaration stating that the application was made by him or with his authorization and that he is the original inventor.[38] It can be seen that this Act has referred an 'individual' for the term 'inventor'. So, the question of whether an AI can be considered as an inventor depends on the ordinary meaning of the term 'individual'.[39] The US Supreme Court, while construing the word 'individual' used in Torture Victim Protection Act, observed that the word indicates a natural person in any Act.[40]

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[31] *Thaler* (n 27) para 116.
[32] *Yeda Research v Rhone Poulenc Rorer International Holdings Inc* [2007] UKHL 43, 20.
[33] Patents Act 1977 (UK)s 2(4)(a)(i).
[34] *Thaler* (n 27) para 117.
[35] 35 USC § 100.
[36] 35 USC § 111.
[37] 35 USC § 115(a).
[38] 35 USC § 115(b).
[39] *Thaler v Hirshfeld* 558 F Supp 3d 238, 241 (ED Va, 2021) para 246.
[40] *Mohammad v Palestinian Auth.,* 566 U.S. 449 (2012) 455.

This observation is also applicable for Patent Law.[41] So, under U.S Patent law, inventor must be a natural person.[42]

Even ordinary meaning of inventor provided by dictionary is 'someone who conceives or contributes to the conception of an invention'.[43] The use of the terms "Someone" and "who" while defining the word suggests that they refer specifically to a human being. The reason behind this proposition is that, if the definition of inventor includes machines, it would have been defined as "Something" instead of "Someone," and "that" instead of "who."

In light of the above discussions, it can be said that the term 'inventor' is only applicable for human being and artificial intelligence machines cannot be considered inventors under IP regime.

2.4. *Contradiction with Other Provisions of Patent Regime*

(i) Eligibility of Patentee

Section 15(1) of the Australian Patents Act 1990 says that a patent can be granted to a person. As this Act does not define person, we need to look into the Acts Interpretation Act, according to which, persons include a body politic or corporate and an individual.[44] As an AI machine does not fall under those categories, it cannot be considered as a person. Hence, AI is not a person to whom a patent can be granted under section 15(1) of the Patents Act.

As mentioned earlier, section 15(1) of Australian Patents Act allows 4 types of persons to whom a patent can be granted. The first type of person is the inventor himself.[45] If this provision is to be applied to AI generated inventions, then the AI that invented the product or process should be granted a patent. In other words, an AI should be the patentee. If it is allowed, then it will collide with other provisions of the Patents Act. For example, patent gives a patentee

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[41] *Thaler* (n 39) para 246.
[42] *Ibid,* para 247.
[43] *Black's Law Dictionary* (11th edn, 2019) 'inventor'.
[44] Acts Interpretation Act 1901 (Australia) s 2C.
[45] Patents Act 1990 (Australia) s 15(1)(a).

exclusive right to exploit the invention and to authorise others to exploit it.[46] Those exclusive rights are personal property.[47] If the patentee is an artificial intelligent machine, then it cannot possess the personal property i.e., the exclusive rights given by the grant, and it cannot exploit or authorise others to exploit those rights. Moreover, the inventor or his successor in title can assign the patented invention to the Commonwealth.[48] So, granting a patent to an AI generated invention would contradict with this provision, because AI cannot have a successor in title, and cannot possess any right and hence it cannot assign such right to the Commonwealth.

The issue of lack of entitlement by AI gives rise to the question of opposition to the grant of a patent, because anyone can oppose the grant of a patent if the applicant is not entitled to the invention.[49] In other words, an opponent can contest the title of the applicant on the ground that a person other than the applicant is entitled to the patent.[50] It also gives rise to the question of cancellation of a patent, because if it is proven to the court that the patentee is not entitled to the patent, the court may cancel the patent.[51] As an AI has no entitlement to the invention, and cannot transfer any entitlement to the applicant, granting patent to its invention will result into opposition or cancellation. Moreover, the Patents Regulations require that the name of the inventor must be provided while applying for a patent of an invention.[52] The purpose of the regulations to require the name of the inventor is to ensure that the applicant is entitled to the patent.[53] And the principles related to this entitlement assume that the invention is an outcome of a human mind.[54] These indicate that the present legislation requires a human being to be the inventor for the purpose of grant of a patent.

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[46] Patents Act 1990 (Australia) s 13(1).
[47] *Ibid,* s 13(2).
[48] *Ibid,* s 172(1).
[49] *Ibid,* s 59(a)(i).
[50] *Commissioner of Patents v Thaler* (2022) FCAFC (Australia) 62, para 103.
[51] Patents Act (Australia) s 138(3)(a).
[52] Patents Regulations 1991 (Australia) reg 3.2C(2)(aa).
[53] *Thaler* (n 50) para 84.
[54] *Thaler* (n 50) para 105.

The second type of person to whom a patent can be granted under Patents Act is a person who, on the grant of the patent, would be entitled to be assigned with it.[55] It means that an applicant can be the patentee if he is qualified as an assignee to the patent when granted. The assignment must be given by the inventor who must be a natural person, because only a legal identity can execute an assignment.[56] An AI machine is not a legal entity and cannot assign the entitlement on the invention to other person and hence, it does not fall within the word 'person' mentioned in this provision.

The third type of person capable of being the patentee is the one who obtains the title to the invention from the inventor.[57] As an AI machine is not a body politic or corporate and not an individual, it cannot transfer any title to the applicant. So, if AI-generated inventions are patented, there will be an obvious gap of entitlement according to this provision. The fourth type of person is the legal representative of a deceased person mentioned above.[58] This provision applies when the inventor is dead during the time of filing the patent application. As the question of dying is not applicable for an AI, this provision is also not applicable to the patentability of its invention.

(ii) Inventive Step Assessment

Now, the matter will be discussed in light of the requirement of inventive step. According to Australian Patents Act, to be patentable, an invention must involve an inventive step when compared with the prior art base.[59] An invention is taken to involve an inventive step if it is not obvious to a person skilled in the relevant art in light of the common general knowledge.[60] The United States Patents Act provides that a patent for an invention may not be obtainable if the invention is obvious to a person having ordinary

[55] Patents Act (Australia) s 15(1)(b).
[56] *Thaler* (n 50) para 108.
[57] Patents Act 1990 (Australia) s 15(1)(c).
[58] Patents Act 1990 (Australia) s 15(1)(d).
[59] Patents Act 1990 (Australia) s 18(1)(b)(ii).
[60] Patents Act 1990 (Australia) s 7(2).

skill in the pertaining art.[61] Under the UK Patents Act, an invention is patentable if it satisfies the condition of involving an inventive step.[62] This Act further provides that an invention is considered to involve an inventive step if it is not obvious to the person skilled in the art. So, it is common provision in the patent legislations of these three jurisdictions that for being patented, an invention must not be obvious to the person skilled in the relevant art (PSA). This PSA is supposed to be an expert professional in the related technological field who has the standard knowledge and talent.[63] If the PSA can reach the invention with the help of his normal skill, then the invention lacks the requirement of inventive step.[64] This person may not be compatible to assess the invention of artificial intelligence and it will create a doctrinal complexity regarding patentability.[65] If an artificial intelligent machine is acknowledged as an inventor, then the questions will arise as to whether the standard of inventive step should be changed and whether the inventive step should be judged by the knowledge of the PSA.[66] Alternatively, it may be necessary to change the definition of the PSA.[67] In other words, artificial intelligence can also be considered as PSA as an alternative. However, including them into the definition of the PSA would make many inventions obvious as a result of which, small number of patents will be eligible for grant, and if AI becomes super intelligent, then it is possible that everything will become obvious.[68] In the light of this discussion, it can be said that the notion of granting patent to

[61] 35 USC § 103.

[62] Patents Act 1977 (UK) s 1(1)(b).

[63] European Patent Office 'Guidelines for Examination in the European Patent Office', (2023), available at https://new.epo.org/en/legal/guidelines-epc/2023/g_vii_3.html, accessed on 23 October 2024.

[64] Schellekens (n 13) 92.

[65] Tabrez (n 11) 309.

[66] *Thaler* (n 50) 119.

[67] Jonathan R. Everhart, 'USPTO Artificial Intelligence (AI) Comments' (2020) United States Patent and Trademark Office <https://www.uspto.gov/sites/default/files/documents/Global-ReEnergyHoldings_RFC-84-FR-58141.pdf> accessed 23 October 2024.

[68] *Ibid*.

AI-generated inventions is contradictory with the patent legislation of these three jurisdictions regarding the process of assessing the inventive step of those inventions. If AI-generated inventions are allowed to be applied for patent, it will be impossible for the patent authority to assess the inventive step of the inventions.

(iii) Infringement by AI

This paper will now discuss the issue in light of the infringement provision. Artificial intelligence can infringe earlier patent, and it is not decided yet who should be liable in such a situation.[69] It is now a significant matter of concern whether AI machines can be held liable and sued for infringement.[70] What is the infringement of a patent? The Australian Patents Act does not define infringement. According to this Act, a patent gives exclusive rights to the patentee to exploit the invention.[71] So, if any person other than the patentee exploits the patented invention, he will be liable for infringing the exclusive right of the patentee. Exploit includes, among other acts, making the patented product.[72] More specifically, an act is taken to be an infringement if it falls within the scope of at least one claim of the patent.[73] It means that if someone does the act of making anything that is covered by any claim of the existing patent, he is liable of infringing it. According to the UK Patents Act, a person infringes a patented invention if he, among other things, makes the invention.[74] The United States Patents Act provides that if anyone without authority makes the patented invention, he infringes the patent.[75] According to all of the three legislations, making an earlier patented product is an infringement of that patent.

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[69] W. Michael Schuster, 'Artificial Intelligence and Patent Ownership' (2018) 75(4) *Washington and Lee Law Review* 1945, 2003.

[70] Shubhi Trivedi, 'Implications of Artificial Intelligence on Copyright and Patent' (2019) 1(4) *Lex Forti Legal Journal* 48, 52.

[71] Patents Act 1990 (Australia) s 13(1).

[72] *Ibid*, Sch 1.

[73] *Coretell Pty Ltd v Australian Mud Company Pty Ltd* (2017) 250 FCR (Australia) 155, para 56.

[74] *Patents Act 1977* (UK) s 60.

[75] 35 USC § 271.

Now, if an AI machine starts to work on a product in a manner that amounts to infringement of an existing patent, there will be a question as to who will be liable for that infringement.[76] So, while inventing something, if an AI machine makes a product that is already claimed in an existing patent, it will create a complexity regarding who will be the infringer. This point goes against the patentability of AI generated inventions under existing legal frameworks.

2.5. *Contradiction with Theories of IP*

There are four established theories to explain the rationale of intellectual property and those are Utilitarianism, Labour Theory, Personality Theory and Social Planning Theory.[77] In this section, the patentability of AI generated inventions will be discussed in light of those theories of intellectual property that rationalise the monopoly granted to the patentee by patent law.

According to labour theory of intellectual property, people working with their own or shared resources have intrinsic entitlement on the outcome of their endeavour.[78] It indicates that when a person invents something, he wants to own the invention. The proposition in the USA is that the society postulates that the person who creates something has the right to enjoy the fruits of it.[79] Labour theory supports granting a patent to the person who has worked for a long period of time to invent something so that he can get some benefits from his invention, however it is not applicable to a computer because it cannot own any property.[80] This notion is also supported by the patent law of Australia, because it requires the name of the inventor in the application in addition to the name of the applicant.[81] It means that the legislation offers an attribution to the work of the inventor. Moreover, High Court of Australia observed that the

[76] Schuster (n 69) 2003.
[77] William Fisher, 'Theories of Intellectual Property' (2001) New Essays in the Legal and Political Theory of Property 68, 5.
[78] *Ibid* 2.
[79] *Ibid* 6.
[80] Abbott (n 6) 1107.
[81] *Patents Regulations* (n 52) reg 3.2C(2)(aa).

patentee is required to reveal his invention fully so that it can be utilised when the patentee's monopoly ends, and this revelation is a compensation given by the patentee for the monopoly granted to him.[82] It means, inventions are patented as a reward for bringing benefit to the public, and as a reward to the creativity of the inventor. In contrast, if artificial intelligent machine is regarded as the inventor, there lies no desire to own the outcome of its effort, and there is no question to give an attribute or reward to the inventor. This does not go with the labour theory of intellectual property.

Similarly, the notion of personality theory is that IP right is a protection in favour of the desire of the deviser against the unauthorized alteration of his creation.[83] In other words, modification of the invention against the inventor's wish is a derogatory treatment to him. This rationale of IP also speculates a human being as the inventor. Creative computer invents something as directed by human and it cannot be aggrieved by the way in which the invention is applied.[84] So, the personality theory of intellectual property also contradicts with the notion of including an AI machine as an inventor for the purpose of patent legislation.

The most popular rationale of IP lies in the utilitarian theory, which requires lawmakers to balance between the exclusive rights and public enjoyment while formulating IP law.[85] Patent regime brings this balance by giving the inventor a monopoly to exploit the invention on the condition that he discloses the invention to the public so that they can enjoy its benefit. This grant of monopoly encourages innovation.[86] The theme of this theory can also be found in the objective clause of the Australian Patents Act which says that the object of the Act is to create a patent system that assists the

[82] *Kimberly Clark Australia Pty Ltd v Arico Trading International Pty Ltd* (2001) HCA(Australia) 8, para 25.
[83] Fisher (n 77) 3.
[84] Abbott (n 6) 1107.
[85] Fisher (n 77) 1.
[86] Mark A. Lemley, 'Property, Intellectual Property, and Free Riding' (2005) 83(4) Texas Law Review 1031, 1031.

economic welfare and balances the interests of manufacturers and the public.[87] One of the elements of this objective clause is to inspire innovation which is attained by ensuring the reward to the patentee for the efforts and expense that are used to invent the useful thing.[88] According to Australia's Industrial Property Advisory Committee, one of the rationales for patent legislation is to recognise the natural rights of the inventors as a reward for their efforts.[89] Granting patent to AI-generated invention is contradictory to this rationale of IP because the questions of reward for inventive effort and inspiration for better technologies are meaningless to the AI machines.

2.6. *AI-generated Inventions and Ethics*

Moral principles should not be forgotten in the discussions of AI and Intellectual Property.[90] According to Industrial Property Advisory Committee, the nation's future prosperity depends upon its ability to innovate, and an improved patent system can foster such innovation.[91] This opinion indicates that innovations can be incentivised by granting patents. However, granting patents for computer made inventions can be disputed because they can hamper the innovative development of humans.[92] So, if patents are granted to inventions generated by AI, it will decrease the creativity of human and in the long run, the nation's prosperity as mentioned by IPAC, will be impeded.

Moreover, according to the European Commission's High-Level Expert Group on AI, many countries and businesses are developing automatic fatal weapon systems which are capable of deciding the

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[87] *Patents Act 1990* (Australia) s 2A.

[88] *Calidad Pty Ltd v Seiko Epson Corporation* (2020) HCA (Australia) 41, para 92.

[89] Industrial Property Advisory Committee (Australia), '*Patents, Innovation and Competition in Australia*' (1984) para 1.2 *http://achristie.com/wp-content/uploads/2014/12/IPAC-Patents-Innovation-and-Competition-in-Australia-ed.pdf*, accessed on 23 October 2024.

[90] Mauritz Kop, 'AI & Intellectual Property: Towards an Articulated Public Domain' (2020) 28(3) *Texas Intellectual Property Law Journal* 297, 330.

[91] Patents, Innovation and Competition in Australia (n 89) 1.

[92] Abbott (n 6) 1106.

specific time and target to attack without human supervision.[93] If inventions by AI are incentivised by patent grants, it will encourage such type of war systems which can endanger the existence of human race on earth.

Furthermore, machines should be our proponent, not opponents and they should always be a helping hand to human beings.[94] In other words, human should use artificial intelligence as a tool that will enhance human capability to invent more sophisticated products. AI should never be regarded as a replacement of human inventor. If AI continues to invent instead of human, it will create a dilemma regarding man and machine. It should not be forgotten that the dilemma between man and machine can reduce the worth of being human.[95] This dilemma can increase if AI machines are regarded as inventors.

Another important issue is that the recent development of Artificial Intelligence has started to impact labour market, and it is predicted by many experts that human-like intelligence may replace human workers within a few decades.[96] It indicates that in near future, many human workers will suffer from unemployment, because they will be replaced by sophisticated Artificial Intelligence that can perform their tasks. This will also affect the national income, because labour taxation is the most important source of revenue which will be impossible if human workers become unemployed.[97] So, it may be said that if AI technologies are encouraged by granting patents to their inventions, it will expedite the unemployment situation and in future, there will be no human inventor.

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[93] Commission, 'Ethics guidelines for trustworthy AI', (Guidelines) (2019) 34, available at *https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai*, accessed on 23 October 2024 (Ethics guidelines).

[94] Kop (n 90) 331.

[95] Ethics guidelines (n 93) 34.

[96] Anton Korinek, 'Taxation and the Vanishing Labor Market in the Age of AI' (2020) 16(1) *Ohio State Technology Law Journal* 244, 246.

[97] ibid 245.

3. AI-Generated Inventions and Market Competition

Free-market principles are distorted by intellectual property rights, without which anyone would imitate and commercialise other's inventions that would keep the price marginal.[98] In other words, IP rights prevent people from unauthorised exploitation of any products. According to Industrial Property Advisory Committee, patent system can create opportunities for entrepreneurs to enter a market however, it also can strengthen the position of already established companies.[99] In this observation, IPAC indicated that, the monopoly granted by patents can be used against market competition. This then becomes a subject matter of competition law that prohibits a corporation with substantial amount of market power to engage in such conduct that can reduce competition in any market.[100] If AI generated inventions are allowed to be patented, what will be its effect on market competition? Will it incentivise entrepreneurs to enter in a market, or will it entrench the position of established companies? This part will try to address these questions. It will try to find out the relationship between data and AI and will discuss how data can be crucial for market competition and how it can create anti-competitive behaviours. Then it will look into whether these anti-competitive behaviours can be regulated under competition regime.

3.1. *AI, Essential Data and Market Competition*

In 1912, the United States Supreme Court ordered several railroad companies to provide competing companies access to certain bridges, considering that without these accesses consumers would have been deprived of competing services.[101] Afterwards, the principle of competition interference established by the US Supreme Court in this case became known as essential facilities doctrine which has been embraced in many jurisdictions.[102] However, the

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[98] Barton (n 2) 3.

[99] Patents, Innovation and Competition in Australia (n 89) 1.

[100] *Competition and Consumer Act 2010* (Australia) s 46(1).

[101] *United States v Terminal Railroad Association of St. Louis* 224 U.S. 383 (1912).

[102] Inge Graef, 'Rethinking the Essential Facilities Doctrine for the EU Digital Economy' (2019) 53(1) Revue Juridique Themis 33, 39.

European courts do not mention the words 'essential facilities', rather they use 'refusals to deal'.[103] The principle of refusal to deal was first considered in Europe in the *commercial solvents* case.[104] According to the fact of this case, Commercial Solvents stopped supplying to Zoja, a raw material that is essential for manufacturing a medicine, and the Court of Justice decided this conduct as a misuse of power and confirmed a fine imposed by the European Commission.[105]

The subject matter of the above mentioned two cases were corporeal in nature. In the present world, digital economy is dependent on data rather than corporeal facilities and it may become the subject matter of essential facilities.[106] Data has become critical for innovation and if they remain in the control of small number of companies, they may increase the companies' market power which will impede the entry of new businesses in the market.[107]

According to the German competition authority Bundeskartellamt, a firm's anti-competitive conducts that are generated by data can be related to merger or acquisition, refusal to access to dataset, discriminatory access to data, exclusive contracts, tied sales of data and price discrimination by using data.[108] Merger or acquisition results in amalgamation of different sets of data that may make competition problem if the data are not capable of being replicated, and the merger can impede the entry of new competitors to the concern market.[109]

Refusal to access to data may create competition problem if the data are essential for the functioning of the firm that is seeking access.[110]

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[103] *Ibid*.
[104] *Ibid* 41.
[105] *Ibid*.
[106] *Ibid* 39.
[107] Mazzi (n 4) 27.
[108] The Bundeskartellamnt, 'Competition Law and Data' (2016) 15-22 *https://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Big%20Data%20Papier.html,* accessed on 23 October 2024.
[109] *Ibid* 16.
[110] *Ibid* 17.

According to Australian Competition & Consumer Commission, a refusal to deal by a firm that has substantial amount of market power in the supply of an essential input may be considered as engaging in anti-competitive conduct if it refuses to supply that essential input to its competitors and the purpose or effect of such refusal is to impede those competitors to compete in the market.[111] When a firm owns a vast amount of data which is disproportionate to its competitors, the firm reach at an advantageous position, and it gets an opportunity to commit anti-competitive behaviour by refusing to deal its data to its opponents.[112] There are many instances where companies possessing big dataset refuse to give access to its data to its competitors. For example, In the United States, a recent example of this phenomenon is cutting off PeopleBrowsr Inc.'s access to the database of Twitter Inc.[113] Another fact of preserving access to data occurred when LinkedIn Corp. attempted to deny hiQ Labs Inc.'s access to its member profiles which was used by the latter company to create a predictive algorithm.[114]

Another data related anti-competitive behaviour is discriminatory access to data which involves allowing access to some while denying access to others.[115] In this case, a firm that has a monopoly over its data, may allow access to its database to some firms who are not competitors, because they handle different type of services. At the same time, the big firm may deny access to another firm which deals with same type of services that may become competitor.

The next anti-competitive strategy involves contracts with third party that contain provisions to prevent competitors from

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[111] Australian Competition & Consumer Commission, 'Guidelines on Misuse of Market Power' (2018) 9 *https://www.accc.gov.au/system/files/Updated%20Guidelines%20on%20Misuse%20of%20Market%20Power.pdf,* accessed on 23 October 2024.

[112] Stanley M. Besen and Philip L. Verveer, 'Competition and Data: Potential Remedies' (2021) 21(2) Wake Forest Journal of Business and Intellectual Property Law 102, 113.

[113] *Ibid* 131.

[114] *Ibid* 132.

[115] Competition Law and Data (n 108) 18.

purchasing the data and as a result, the competitors' customers struggle to receive their products or services.[116] In 2010, the European Commission conducted a probe against Google Inc. alleging that, with an intention to shut out competing search tools, it prevented its advertising associates from publishing specific types of advertisements on behalf of its competitors.[117]

Anti-competitive conduct may also occur when a giant undertaking with an immense database tie the sale of its database with the sale of its own services.[118] In this case, a big firm which has a big database and deals with another service, may offer special benefits to its data purchasers. It may offer that it will give those benefits if the data purchasers purchase the other service from it. It can create competition problem if its competitor is the provider of the other service which it aims to tie.

Another anti-competitive behaviour may arise by fixing discriminatory price with the help of customers' preferential data. Customers' data can be used by firms to find out different interested customers and to determine the different prices of same product for different groups of customers.[119] In this case, some customers pay higher price than the others for the same products.

From the above discussions and examples, it can be said that giant companies that have gained substantial degree of market power by means of their huge databases may intend to dominate the market by taking different types of strategies. These are anti-competitive

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[116] *Ibid* 19.

[117] European Commission, 'Antitrust: Commission Probes Allegations of Antitrust Violations by Google' (Press Release, 2010) <https://ec.europa.eu/commission/presscorner/ detail/en/IP_10_1624 > accessed 23 October 2024.

[118] Competition and Market Authority, 'The Commercial Use of Consumer Data' (Report, 2015) 90 <https://assets.publishing.service.gov.uk/government/uploads/system/ uploads/attachment_data/file/435817/The_commercial_use_of_consumer_data.pdf> accessed 23 October 2024.

[119] Nathan Newman, 'The Costs of Lost Privacy: Consumer Harm and Rising Economic Inequality in the Age of Google' (2014) 40(2) William Mitchell Law Review 849, 867.

behaviours and can create a barrier to entry. These anti-competitive behaviours can be committed by companies that use artificial intelligence because, for becoming effective, AI technologies require a considerable amount of data that may constitute the market power.[120] Collecting, storing and analysing those data involve high cost which would be financially impossible for small businesses.[121] The companies that already possess immense databases and use those to train their artificial intelligent machines to generate new products, may refuse to share those data to small companies. This will enable the giant companies to dominate the market by generating new products quickly compared to the companies that are not yet to using artificial intelligent. As data has become a crucial input for innovation, doing any of the acts described above by a firm that has an immense database may also amount to engage in misuse of market power.

3.2. *Potential Remedies*

Encouraging innovation and intensifying consumer welfare are the common purposes of Intellectual property laws and competition laws.[122] More clearly, IP laws incentivise innovation by building up property rights, and competition laws patronise consumer welfare by proscribing anti-competitive actions.[123] If innovation is encouraged, the consumers will ultimately be benefited by getting new and improved products. So, the ultimate goal of these two sets of laws is the welfare of consumers. Hence, they should have some provisions that can regulate anti-competitive behaviour even if that behaviour flows from data. This essay will now look into the remedies that can be employed to regulate this anti-competitive concern in light of some real-world examples of remedies already provided against such kind of behaviour.

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[120] Mazzi (n 4) 30.

[121] *Ibid*.

[122] U.S. Department of Justice and the Federal Trade Commission, 'Antitrust Guidelines for the Licensing of Intellectual Property', (Guidelines, 2017) 2 <https://www.justice.gov/atr/ IPguidelines/ download > accessed 23 October 2024.

[123] *Ibid*.

There are many instances where authorities prohibited the act of discontinuing existing data arrangements. In *People Browsr Inc v Twitter Inc* the US District Court issued a restraining order against Twitter Inc.'s decision to cut off People Browsr Inc.'s access to its database considering Twitter's decision as violation of antitrust law.[124] In *Aspen Skiing Co v Aspen Highlands Skiing Corp*, the United States Supreme Court turned down Aspen Skiing Co.'s attempt that involved terminating an existing ticketing arrangement with another company considering that this refusal amounted to discouraging the customers from doing business with smaller rival.[125] The principle established in this case may be applicable to the litigations related to discontinuing an arrangement of sharing data with rivals.[126] Similarly, in *hiQ Labs Inc v LinkedIn Corp*, the US Court of Appeal upheld the decision of a District Court that granted an injunction against LinkedIn Corp.[127] This injunction restrained LinkedIn from preventing hiQ's access to public profiles available on its website.[128]

The abovementioned cases are examples of remedies that were granted against refusal to access to data by terminating existing arrangements. In such type of anti-competitive situations, authorities can restore the pre-existing arrangements rather than making new ones.[129] On the other hand, the denying to access may take place for a long period of time, and in such case, compelling the data holder company to share data can be a proper remedy.[130]

Data related anti-competitive behaviour may result from other types of strategies taken by firms. The common strategy taken by companies to achieve larger accumulation of data is merging with another firm that owns a large database, or acquiring small

[124] 2013 U.S. Dist. Lexis 31786 (ND Cal, 2013).
[125] 472 US 585.
[126] Besen and Verveer (n 112) 131.
[127] 938 F 3d 985 (9th Cir, 2019).
[128] *Ibid*.
[129] Besen and Verveer (n 112) 132.
[130] *Ibid,* 134-135.

entrepreneurs that is growing with data rapidly.[131] The potential remedies for data-related competition problems that result from mergers or acquisitions, are as follows:

i. When a proposed merger involves combining the acquiring firm's data with the data of the firm that is proposed to be acquired, it may weaken other firms as competitors and this may be remedied by blocking the proposed merger, and thus the previous competition between the merging firms may be preserved.[132]

ii. Sometimes, merger related competition problem can be addressed not by reversing the merger, but by creating an arrangement of selling data to the competitors.[133] For instance, when Cox Automotive wanted to acquire Dealertrack Technologies Inc, the US Department of Justice, for maintaining pre-existing competition in the market, ordered Cox Automotive to sell the inventory management system of Dealertrack as a condition for allowing the acquisition.[134]

iii. Merger related anti-competitive data accumulation may also be remedied by allowing the merger with a condition that the merging firms will not combine their data.[135]

The abovementioned remedies may be imposed on the occasion of an anti-competitive behaviour that arise out of accumulation of data. However, if generating products using artificial intelligence machines is discouraged, then these behaviours will be less likely to occur. In contrast, if these inventions are encouraged by granting patents, it will create opportunities for giant companies having big data to behave anti-competitively one way or another. This essay

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[131] Miljana Todorovic, 'Big Data & Antitrust: Propensity of Data Accumulation to Raise Barriers to Entry', (*Institute for Internet and the Just Society*, 11 April 2021) <https://www.internetjustsociety.org/ propensity-of-data-accumulation-to-raise-barriers-to-entry>. Accessed 23 October 2024.

[132] Besen and Verveer (n 112) 117.

[133] *Ibid* 121.

[134] *Ibid* 122.

[135] *Ibid* 118.

proposes that AI-generated inventions should not be encouraged by granting patent for flourishing human innovation, social welfare and a good competitive atmosphere.

4. Conclusion

AI generated inventions are not currently patentable under patent regime. It is also mentionable here that those inventions are contradictory with the established theories of intellectual property as well as ethics. After rigorous analysis of legislations and case laws, the paper has found that only human invented things are included in the definition of patentable inventions, and the term 'inventor' indicates human only, not any machine. In the ethical analysis, the paper has indicated a link between AI-generated inventions and issues of future unemployment, decrease of human innovativeness and international peace.

Moreover, by revealing the relationship between AI and anti-competitive conducts, the paper shows that those conducts may be increased by AI-generated inventions. While going on with this discussion, some real-world examples of such conducts are depicted. Through these examples, it has also been shown that data is essential for contemporary businesses and that accumulation of immense amount of data may create substantial amount of market power. This market power may be misused by firms that have large databases. The different strategies of misusing market power have been depicted. The paper ends with some potential remedies that are already applied for anti-competitive conducts flown from data related market power.