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Protecting AI-Generated Inventions under the UK's IP Regulatory Regime

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The United Kingdom is one of the world's oldest and most progressive IP legal systems. UK presents one of the most pragmatic and conscientious IP legal systems when regulating unconventional technologies such as Artificial Intelligence (AI) and AI inventions. By adopting a blend of conservative and progressive approaches to AI regulation, the UK's IP legal system promises to be one of the most robust, optimal and collegial AI regulatory jurisdictions for criticallegal analysis and examination. UK's regulatory and policy regime for AI and AI inventions is emerging from the multi-stakeholder and multi-institutional consultative process in which the perspectives from eminent academics, experts from industry, state regulatory and research institutions are being solicited and synthesized. The UK is currently undertaking a consultation on the impact of artificial intelligence (AI) on intellectual property (IP) Law, specifically on patents and trade secrets.

The outcomes of this consultation will help shape the UK's IP framework, ensuring it remains fit for purpose in the digital age and encourages innovation while protecting the rights of inventors and creators. The research paper critically examines the legal and economic intricacies and ramifications of the UK's quest to fashion a futuristic yet conscientious IP legal regime for regulating AI and AI-generated inventions. By adopting a doctrinal, critical legal and economic analysis approach, the research paper first examines the fitness of the UK's patent, copyright and trade secret laws for protecting AI-generated inventions to accentuate the regimental and regulatory inadequacies therein. The paper cross-examines how such regulatory inadequacies and implications are being resolved through the consultative engagements between the UK's Artificial Intelligence Office under the auspices of the UK's Intellectual Property Office and experts from academia and industry.

Keywords: AI, IP, UK Government, Patent, Trade Secret

In recent years, the rapid advancement of artificial intelligence (AI) technologies has presented unique challenges to intellectual property (IP) laws and systems worldwide. As AI continues to evolve and demonstrates the ability to generate novel and inventive solutions, questions arise regarding the legal and economic implications of protecting AI-generated inventions. This critical analysis focuses on the United Kingdom's IP legal system and examines the complex issues surrounding the protection and ownership of AI-generated inventions.

The United Kingdom has a robust legal framework for protecting intellectual property rights, encompassing patents, copyrights, trademarks, and designs. However, the traditional IP legal system was primarily designed to cater to human inventors and creators, raising concerns about its adequacy in addressing AI-generated inventions. The Law did not envisage AI systems becoming increasingly sophisticated and autonomous. They challenge the conventional notion of inventorship and raise fundamental questions about allocating rights and responsibilities.

One of the primary considerations when analyzing the legal implications of protecting AI-generated inventions is the determination of inventorship. The legal framework in the UK, similar to many other jurisdictions, recognizes an inventor as a natural person who significantly contributes to the inventive process. However, in the case of AI-generated inventions, where the creative output stems from algorithms and machine learning, identifying a human inventor becomes a complex task. This raises questions about the eligibility of AI systems to be named as inventors and the legal consequences associated with such recognition.

Furthermore, the economic implications of protecting AI-generated inventions under the UK's IP legal system warrant careful examination. The commercialization of AI technology involves significant investments in research and development, making IP protection crucial for incentivizing innovation and promoting economic growth. However, an overly restrictive IP regime could stifle

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the development and dissemination of AI technologies by creating barriers to entry and hindering collaborative efforts. Striking a balance between rewarding innovators and facilitating widespread access to AI-generated inventions is a delicate task that requires a nuanced analysis of the UK's legal and economic landscape.

This critical analysis explores the legal and economic ramifications of protecting AI-generated inventions within the UK's IP legal system. By examining the existing legal framework, relevant case law, international perspectives, and economic considerations, we seek to evaluate the effectiveness and adequacy of the current system in addressing the unique challenges posed by AI-generated inventions. Additionally, we will consider potential alternative approaches and policy recommendations that can foster innovation, promote fair competition, and ensure the optimal utilization of AI technology for the benefit of society.

In conclusion, the intersection of AI technology and intellectual property law presents a complex and evolving landscape that necessitates careful analysis. This critical examination of the legal and economic implications of protecting AI-generated inventions within the UK's IP legal system aims to shed light on the challenges, opportunities, and potential reforms required to address the unique characteristics of AI as an inventor. By engaging in this analysis, we hope to contribute to the ongoing discussions and shape policies that strike the right balance between incentivizing innovation, protecting intellectual property rights, and fostering the societal benefits of AI technology in the United Kingdom.[1]

Understanding AI

Artificial Intelligence (AI) connotes unnatural intelligence that emanates from artificial sources. Aside from humans, many animals, such as dogs, cats, monkeys, parrots and horses, often exhibit behaviours deemed to be intelligent. However, these sources of intelligence are natural. Therefore, The domain of AI is limited to the intelligent creations of humans and creations emanating from therefrom.

The term "Artificial intelligence" was conceptualized in 1956 by a computer scientist, Mr. John McCarthy, to denote a situation where computers are programmed to process, analyze and take logical decisions and actions in a similar manner that a human would have done if they were presented with exact information to process and take intelligent decisions and actions. Sir Alan Turing suggested the "Turing Test" as a practical test for determining if robots are intelligent by anonymizing human and machine respondents to text-based communication and comparing the two respondents after communication to determine the eliciting view of an observer regarding which responses they thought came from robot/machine and which responses came from a human. In his view, the machine could be regarded as intelligent if both respondents sounded intelligent, but the observer is unable to distinguish and identify the two respondents effortlessly.

Humans have invented robotics, which has demonstrated the potential to outperform humans' intellectual acumen and agility, except for showing emotional intelligence and empathy, which are exclusive attributes of humans. Many humans cannot store, transmit, analyse and harmonise ginormous, overlapping, conflicting and complex data from multifaceted sources. AI is appraised to achieve up to 97% accuracy and outperform three pathologists when deployed to diagnose patients' health conditions.

AI has the potency to analyse, recognize and distinguish between different speeches, voices, and faces of people. AI is becoming a more viable substitute for human labour[2] and takes actions that manifest in autonomous inventions, but the protection under IP Law has come under intense ethical, legal, and moral scrutiny. AI is permeating every facet of human endeavor and has the potential to transform healthcare, communication, energy, food processing, manufacturing, and transportation industries in unprecedented ways.

However, maintaining trust in administrative, legal, and business transactions whilst AI remains involved is a significant challenge for AI governance and risk management since the costs of regulating and not regulating AI are overbearing. It is particularly problematic to apply IP laws to artificial creations whose intent behind their actions cannot be determined by any stretch of legal reasoning and cannot recognize the consequences of their actions and inactions. Rectificatory justice, restorative justice, behaviour modelling and deterrence, which underscores the essence of law enforcement, could be achieved only with sentient legal entities with the capacity to understand and analyse linkages between cause and effect and actions and their consequences. It is negatory and counterintuitive to enact and

enforce the law on robots and actions which are incapable of learning or unlearning, as the case may be, to achieve the desirable legal objectives of the law. It would be the acme of legal absurdity to promulgate laws intended to regulate, model or rectify the behaviour of capricious and inanimate AI, which lacks the qualities and attributes of the legal person. Legal liability can only be borne by legal entities, such as corporate entities because human ownership and proprietorship of such entities are legally established. Intellectual property Law only places legal liability on the registered or proprietary owner of the intellectual creation, in this case, AI, whilst Corporate Law provides the legal latitude for legal liability to be placed on corporate entities. AI could assume legal personhood and liability only if intellectual legal scholars and regulatory authorities are prepared to consider a regulatory drift from or merger between Intellectual Law and Corporate Law principles. Besides, the debate on whether AI should be granted legal personhood within normative doctrines and justifications of Intellectual Property Law is not settled. It may never be settled as long as the legal locus of AI is not established and the actions of AI are indeterminate.

Many human inventions foment unintended legal offences in society, to which the humans connected to the operations of such invention offences are held legally liable, especially when the negligence or incompetence of operators or associated persons is identified as the cause. But no one, not even lawyers, bothers to question the propriety of the assignment of legal liability. Strict and absolute legal liability is often applied to owners or operators of invention offences which cause or potentially cause irreparable damage to the environment, life and property. For instance, a driver is likely to be liable for an accident that results in fatality even when the accident might have occurred because of mechanical fault due to a manufacturing error or an unanticipated mishap that threw the driver out of control.

In the same stretch of logic, it may be consistent with conventional legal liability norms to place proportionate legal liability emanating from AI's legal infractions on humans who invent and deploy the AI. This line of reasoning, even if legally sound, may not be in sync with the anomalous nature of the ownership and proprietary rights of AI inventions within the regulatory ambit of IP Law driven by utilitarian/economic, legal, labour, and incentive doctrines. Perhaps, an optimal legal model for resolving the ownership cum legal liability anathema lies in the synchronisation of IP Law, Criminal Law and Corporate Law Doctrines. The legal dilemma arises in who enjoys the incentives and bears the legal liability in autonomous AI-generated inventions. Natural justice requires those who enjoy the incentives to bear the liability. This maxim of natural justice is the oversimplification of a complex legal conundrum that envelops the assignment of legal liability for AI-generated inventions as ownership by and legal personhood status of AI for its intellectual inventions remain enigmatic in scholarship, regulatory and legislative arenas.

Approach towards Regulating AI and AI-Generated Inventions

The widespread consultations and public discourse undertaken by the UK's IP Office, involving industry experts, scholars, and regulatory agencies in the field of IP, have culminated in the UK's "National AI Strategy" in 2021, in which the UK aspire to become a "global AI superpower Development" in 10 years. The fundamental aspirations underpinning this strategy include transforming the UK’s economy into an AI-driven economy by investing in building AI ecosystems and placing the UK as the global model for AI governance. An eclectic and collegial approach to AI regulation permeates the philosophical foundations and consultative processes underpinning the UK's AI strategy. The UK government departments at the forefront of AI governance and regulation include the Department for Digital, Culture, Media, and Sports; the Department for Business, Energy and Industrial Strategy; the Department for Science, Innovation and Technology; and the Office for Artificial Intelligence.

The ethical, legal, moral, safety and security implications of an AI-driven economy remain at the epicenter of the discussions and development of AI risk mitigation and regulation.[1] In pursuit of its aspirations to be a global hub and model of quality governance for AI technologies, the UK promulgated the AI white paper as a policy roadmap for managing AI risk in July 2022, known as the "Pro-innovation Approach to Regulating AI".

The core focus of the white paper is to foster a regulatory ambience that guarantees enhanced transparency and safety standards, as well as privacy and security, whilst safeguarding human rights without stifling AI inventions and innovations. The

Alan Turing Institute plays a leading role in the UK's quest to create an "AI Standards Hub" by which the UK would prescribe globally cogent technical standards for AI governance and foster AI ecosystems to place the UK as the preferred destination for AI inventors and investors from across the globe. Under the functional mandate of the Alan Turing Institute, the UK has identified strategic International partnerships in the investment of AI research and development with internationally reputable AI research institutes such as RIKEN of Japan as a significant roadmap to achieving its global AI governance and leadership aspirations. The Institute has also developed basic guidelines for identifying the possible sources of AI-related harm, such as misuse, questionable design and unintended negative consequences arising from the deployment of AI technologies.

Normative Reflections on the Protection of AI-Generated Inventions under IP Law

The design of the UK's IP laws depicts the adversarial legal system of the common Law tradition in which the jurisprudence underscoring the notion of justice and equity all evolve around natural persons with incompatible legal claims and contestations, seeking fair trial and equitable redress in the Court of Law presided over by judges and jurists with purely humanistic objectives but without a scintilla of care and mandate for the welfare and property rights of robots. The term "intellectual property" connotes property, which creation and ownership emanate from intellectual labour, and the terms "intellectual" and "labour" are both attributes of humans. The normative justification for legal IP protection is anchored around the dispensation of intellectual labour, extension, and projection of personhood through intellectual expressions and inventions and the creation of legal and economic incentives for the progress and advancement of useful arts and science in society.

Before the question of whether AI-generated inventions should be protected by IP Law can be answered, the first question to be asked is whether AI-generated inventions can be recognized as intellectual property in the first place. To put this question in a more straight forward perspective, does AI have an incentive-oriented and property-owning intellectual personality? Another perspective to this line of normative enquiry is, will the inventions of AI be improved quantitatively and qualitatively by extending IP ownership and protection to AI for its inventions? Machines, robots, and algorithms are not sentient members of society and cannot be objects and beneficiaries of IP protection. The pursuit of legal actions for IP rights infringement

Whether machines can recognise or be lured by legal and economic incentives or deterred by punitive measures embedded in IP laws sounds as absurd as whether AI should accord IP rights and protection under current IP legal doctrines. Quizzically, AI should be accorded rights over whom or protection against whom? What social, economic or moral damage would AI suffer if IP law fails to protect AI inventions? AI, as the invention of human intellect, is incapable of inventing technologies that are inconceivable by humans. AI and inventions of AI are the only evidence that humans are currently utilising a higher level of our intellectual potential and nothing more than that. With the help of algorithms providing specific commands for AI to perform, humans program AI to accomplish desired intelligent, routine and laborious tasks. Therefore, it will appear reasonable to discuss the prospects of applying to human inventors of AI technologies a more fortified, dynamic, and futuristic IP legal regime that would address the excesses of the inventions of their AI inventions.

Robots and algorithms are not social, economic, or political entities and, therefore, should not, in principle, be the object of any law. Essentially, the claim of IP infringement by AI against the human party or entity in a Court of Law would only sound frivolous to the extent that AI cannot suffer any moral, economic, or social damage. The phraseology around the performance of legal obligations and enjoyment of benefits by creators and inventors of intellectual works did not envisage the mythology of robots and algorithms in a legal tussle with humans in courts over claims of alleged IP infringements. IP Law of the UK, just as IP laws of most, if not all, jurisdictions, is not normatively and practically versatile and amenable enough to accommodate AI with its unconventional characteristics in legal ownership, obligation and liability. The anomalous nature of AI and AI-generated inventions has necessitated the call to governments to create "legislations explicitly

tailored to AI inventions". Countries with progressive IP regulatory regimes, such as the United Kingdom, United States, Europe, South Korea, Taiwan, New Zealand and Australia, have rejected applications for AI patents. Thus, any attempt at granting AI patents over its inventions would trivialise and undermine well-established national and international IP legal doctrines and jurisprudence.

AI as the Sole or Joint Inventor under Patent Law: The Implications

The answer to the question of who should be recognized as the inventor of an invention that emerges from an AI machine does not elicit a straight answer. Two types of inventions involving AI can be distinguished as "AI-generated" inventions and AI-assisted inventions, and the two types of AI-related inventions are distinguishable based on the magnitude of AI autonomy in the invention of technologies.

The ownership of an invention under Patent Law Doctrine is encapsulated in two scenarios – sole and joint inventor. However, depending on the permutations underpinning AI-generated invention, there could be as many as three possible claimants of an AI-generated invention, *viz*: the inventor of the AI; owner of the AI by contract, license or assignment; employee of the owner or licensed/assigned entity who is the programmer or operator of the AI. In this instance, the AI creator/inventor, the licensee of the AI, the AI itself, and the employee of a licensee who operates the AI may, depending on how the AI was programmed and by whom, all have a direct or indirect legal basis for claiming inventorship of the AI-derived invention. The question as to which of these possible inventors of AI-derived inventions should be assigned exclusive right of ownership by Patent Law will depend on the following scenarios:

Based on Patent Law's economic incentive theory persuasion, the original inventor(s) of the AI or a conventional technology should be recognized by patent Law as the sole or joint inventor(s).It is unlikely that the original inventor of AI would find an economic reason to invent AI technologies in a situation where they are not entitled or jointly entitled to patents for secondary- inventions emanating from their primary AI invention (s). The incentive to invent would diminish, especially when the secondary patent(s) command(s) high market value compared to or more than the market value accruing from their original AI inventor. However, this argument would have no merit under the current UK Patent Law if the primary AI-inventor is not the programmer and, therefore has no knowledge of how the programming manifested in the AI and how the programming culminated in the new AI-derived invention.

In an invention where the inventor of an AI licenses their AI technology to another entity and the AI invents a new technology in the work environment of such other entity in a manner that the AI-inventor never envisaged, extant Patent Law Doctrines and conventions provide no legal grounds for the AI inventor to claim ownership over their AI-generated invention. Moreover, to the extent that the AI inventor could not envisage what their AI invention is capable of inventing, it is unlikely the AI inventor would be able to prove paternity or novelty and how the invention meets patentability criteria upon which they could claim dispensation of intellectual labour and inventorship in order claim patent over such invention.

In a situation where the operator of a licensed AI is the only one who understands how they programmed the AI to generate the invention, it would be tantamount to depriving the operator of their intellectual property if the Patent Law appropriates ownership rights to the AI inventor. The incentive theoretical persuasion of Patent Law would favour the operator for combining their programming knowledge with AI to create new technology.

From the standpoint of the current UK Patent Law on employee inventions, the law bestowsownership of employee inventions to the employer. This implies that when an employee discovers an invention using the employer's AI technology, the ownership is vested in the employer and subject to fair compensation to the employee by the employer. Any thought about joint ownership of a patent over an AI-generated invention, relative to the employee-employer invention legal tenets, precludes the AI licensor, programmer, operator and employee and confines the possible candidates of joint ownership to the employer/licensee and the AI inventor, where the former and the latter are separate entities. However, the sole owner could be claimed where the former and latter are inseparable.

Unless AI can be accorded the higher status of legal personality; unless criminal liability and civil liability can be established under Criminal Law and Civil Law, respectively, as the case may be; and unless AI is capable of enjoying rights and performing

obligations of an inventor under the Patent Law; it would be legally problematic and unfathomable for Patent Law to recognise AI as the inventor or assign patent rights thereto.

The current UK Patent Law was designed with a human inventor's mind. For the Patent Law to recognise AI as the inventor of an invention that emerged in the course of its application, it requires one of the following two approaches. The United Kingdom's Government may consider the following:

(i) Either reforming the current Patent Law completely to recognise AI as an inventor and a legal person and therein resolve the legal and moral quagmire that traverses the conceivable joint ownership of inventions between humans and AI of AI-induced inventions – which appear not to be a feasible option - or;

(ii) Designing a specialized and substantive legal framework for AI and AI-induced inventions to co-exist with status quo patent regiment - human-oriented Patent Law – which appears more feasible and probable.

Exclusive proprietary rights assigned to inventors through the instrumentality of Patent Law are passive rights, just like human rights. Passive rights in the sense that where they are violated, it would take the victim or law enforcement agency or activist to the principles and relevance of the law by ensuring that the victim is legally recompensed and the offender atones for committing such legal infraction. Thus, Patent Law is not self-enforcing, and the so-called intelligent AI is incapable of pursuing legal action against infringers of its rights over its inventions. Therefore, it would require humans to serve as the legal attorney of the AI legal action in court against infringers or, consequently, infringers of its patent rights. Moreover, any compensation accruing from such legal action would inevitably benefit a human. Conversely, where AI-induced invention is being held legally liable in court for any infringement, a human would assume power of attorney to recuperate or repair the 'harm' to the AI – provided that such an undertaking is legally sound and humanly reasonable.

Conferring Inventor Status on AI: Regulatory Implications under Patent Law

The answer to whether AI is capable of inventing autonomously is in the affirmative and not in doubt. However, the question of conferring inventor status and patent grant on AI for its autonomous inventions elicits ethical, moral and legal concerns. Employing a patent grant as a regulatory incentive to induce technological inventions is intended for human inventors who require extrinsic motivation of a pecuniary nature to invent and sustain their drive to invent more technologies in future. Unlike humans, machines are not responsive to fiscal or regulatory inducements, and regulatory incentives would serve no purpose in AI's propensity to continue inventing technologies. Notwithstanding, crediting an AI with the status of an inventor or granting patent rights to an AI for its technological invention could implicitly incentivize the inventor of the AI or the human agent who has the right, assigned by law or otherwise, to appropriate the economic benefits accruing to the AI for the AI's invention.

In this context, the human agent of the AI is the person who either invented or operated/programmed the primary AI technology or has been licensed the prior/original AI technology. However, crediting AI with an inventor status, in which patent rights may be assignable to the AI, would not induce or discourage future inventions if the (human) beneficiary of the AI patent did not engineer or facilitate the process leading to the invention by the AI. In other words, where the AI is solely responsible for its invention (without human involvement), conferring patent rights on the AI as the inventor would not encourage or discourage future inventions. This is the case because AI is irresponsive to fiscal, regulatory or status inducements, just as AI lacks the legal personality to stand legal trial in court or is incapable of bearing legal liability for its legal transgressions. An inventive AI could be fortified into a legal person only under Corporate Law, where the AI could be treated in the same manner as a limited liability corporate entity.

In a corporate scenario, AI is accorded an inventor's and legal person status; in that case, it may positively impact innovations developed from AI inventions because the human agents of the AI may be shielded from potential human rights infringements or legal liabilities that may be incurred or caused by the AI invention. By according to AI, the higher status of an inventor under the ambit of Corporate Law, the AI will bear the legal risk arising from the actions of the AI's inventions, and the managers of the AI and its creations would bear fiduciary liability and liability emanating from dereliction of duty and willful

negligence. Consequently, human agents feel more confident adopting or deploying AI inventions for social or economic use.

However, it is not legally optimal for human agents to derive the benefits but shielded from legal liabilities arising from AI-generated inventions. In the absence of human benefactors of AI-generated inventions, such inventions could be concealed as trade secrets or cloaked in perpetual obscurity and confidentiality by the managers of AI, thereby significantly constricting the rate of public disclosure of AI-generated inventions and the stock of technological knowledge in the public space. Where AI is not credited with inventor status or accorded patent rights to the benefit of the human managers, the fallout is opened to the following outcomes.

A deliberate decision to conceal IA inventions is within the ambit of human influence or manipulation. AI technologies are not social agents and cannot perform social activities such as disclosing or concealing AI-generated inventions by themselves. It requires humans to recognise and choose to disclose AI inventions publicly or otherwise. As long as it would not be elevated to the high ground of inventor and vested with exclusive economic and legal rights over its inventions, the AI's human-agents or managers, who stand to derive benefits therefrom, would, more likely than not, keep AI inventions confidential as far as publicly disclosing the AI inventions would jeopardize their economic interests. Self-interested humans would orchestrate both the disclosure and concealment of AI inventions, and they would mainly, if not always, act in ways that serve their personal interests at the expense of the utilitarian or altruistic imperatives propagated in the normative foundations of Patent Law. AI, which does not need human assistance to invent technologies, would continue to invent with or without a patent grant or be credited as the inventor if it is shielded from human manipulations and influences.

Undoubtedly, where the patent system cannot assign patent rights or inventor status to AI over the AI's invention, the questions that arise would include, but are not limited to, the following: (i) To whom should the status of inventor or patent rights be accorded? (ii) Who reserves the right to exercise or appropriate economic, legal and moral rights over the AI's invention? (iii) Who bears any legal liability arising from legal actions on transgressions or infractions caused by the AI invention? However, it must be underscored that granting AI the inventor status would not provide satisfactory answers to these questions. On the contrary, crediting AI with the status of the inventor may incentivize future AI inventions to the extent that any human-agent who is a visible facilitator of the AI invention, in which case a human and AI joint ownership of the patent for the invention may be contemplated. Thus, it would be a case of unjust enrichment to invest sole ownership of inventions that resulted from the combined efforts of a human and AI, and it is only consistent with the principles of equity and fairness in Patent Law to recognise the human and AI as joint inventors. The shortfall in the Human-AI joint inventor model is how a balance of power over ownership, obligations, rewards and control would be accomplished between a human and an inanimate entity.

When AI cannot be credited with inventor or patent holder status and the liabilities outweigh the benefits, the human-agents may not find any incentive to facilitate the AI−generated inventions. Besides, public disclosure of AI inventions to obtain patent protection over AI-generated inventions would plummet. Human-agent play a facilitator role in producing AI inventions or publicly disclosing them. The human facilitator may not find an economic reason compelling enough to continue facilitating both roles if the patent system is not designed to internalize or mitigate legal liabilities arising from AI inventions. Suppose the human-agent solely suffers legal liabilities from AI inventions. In that case, the human-agent might fail to facilitate future AI inventions if the benefits they derive cannot offset the liabilities and keep them afloat.

The anticipated AI revolution may be truncated if, due to any of the reasons espoused above, human-agents conceal AI inventions from the public by failing to disclose them (AI inventions). Public disclosure of AI inventions is a crucial catalyst and trigger for the AI revolution. Where AI inventions are cloaked in secrecy for any of the above reasons, the diffusion of AI technological knowledge in the UK's economy would be significantly slowed down, if not utterly suppressed. It may be challenging for the UK to accumulate the amount of AI technological knowledge needed in the public domain to propel future AI inventions to trigger the AI revolution unless the economic interest of the human-agents and managers of the AI, who exercise the discretion to either publicly disclose or conceal AI-generated

inventions, is not factored into the considerations underpinning the design of the AI governance and regulatory regime.

Protection of AI-Generated Inventions through IP Legal System

The functional elements accentuated here under are the salient building blocks for creating functionally optimal and legally sound intellectual property legal regimes for effective governance and regulation of AI and AI-generated inventions.

Term "AI-Generated Inventions"

To develop a clear, unambiguous and comprehensive definition of the term AI-generated inventions within the IP legal frameworks requires achieving clarity in the definition of the term which further implies streamlining the level of human involvement in the inventive process to distinguish inventions that AI autonomously generates from human-assisted AI inventions. Such distinction and clarification lay the normative foundation for conceptualising a nuanced and systematic AI governance and regulatory framework that addresses the complex, transitional, and burgeoning challenges the UK Government and other progressive AI jurisdictions are embattled with.

Adapt Patent Laws or Create a *Sui Generis* Regulatory Regime

Amending patent laws to adapt the paradigmatic legal quandaries of AI-generated inventions could resolve the existential and potential legal lacunas that evolve in lockstep with the AI revolution. Establishing specific criteria or standards for determining patent eligibility criteria, ownership and legal personhood, and legal liability status of AI over AI-generated inventions could culminate in a sound legal framework for regulating and government AI efficaciously. Proposing the creation of a sui generis legal regime for governing and regulating AI may seem to be a revolutionised idea, but it may be the most lucid and futuristic pathway to effectively regulating AI in an evolving AI paradigm with unique challenges posed by AI's autonomous inventive capabilities. Consider the creation of new IP rights that specifically address AI-generated inventions. These rights could be tailored to accommodate the unique characteristics of AI, such as granting limited exclusivity or alternative licensing models that balance commercial interests with public access and benefits.

Making it mandatory for public disclosures to manifest by institutionalising mechanisms to ensure AI-generated inventions are not concealed from the public as trade secrets. Thus, it introduces disclosure obligations for AI-generated inventions to ensure transparency and enable knowledge sharing. This could involve disclosing the extent of involvement of AI systems in the inventive processes and providing access to relevant training data and algorithms used. Such disclosures would facilitate the upsurge of AI technologies and fair competition among innovators whilst preventing AI from sliding into the path of trade secrets.

Foster Open Innovation

Encourage collaborative and open innovation practices by promoting the sharing of AI models, data, and algorithms while protecting sensitive or proprietary information. Establish frameworks that facilitate the voluntary exchange of knowledge and best practices, fostering a culture of innovation and enabling more comprehensive societal benefits.

Support Regulatory Sandboxes

Establish regulatory sandboxes that allow innovators and organizations to experiment with AI technologies within a controlled environment. Sandboxes allow testing and refining new approaches, addressing legal and ethical challenges, and collaborating with regulatory bodies to develop appropriate guidelines for AI-related inventions.

Enhance Patent Examination Procedures

Invest in training patent examiners to understand the complexities of AI technology, enabling them to evaluate patent applications related to AI-generated inventions effectively. Encourage collaboration between IP offices, technology experts, and stakeholders to develop specialized expertise and resources for assessing AI-related inventions.

Develop Ethical Guidelines

Encourage developing and adopting ethical guidelines for AI research, development, and deployment. These guidelines can address issues such as bias, transparency, accountability, and the impact of AI on human rights. Society can ensure that AI technologies are developed and utilized responsibly by integrating ethical considerations into AI innovation.

Foster International Collaboration

Engage in international collaborations to harmonise IP laws and regulations for AI-generated inventions.

By aligning approaches and standards globally, it becomes easier to navigate the legal landscape, foster cross-border innovation, and prevent conflicts arising from differing legal frameworks.

It is important to note that addressing the legal, multidisciplinary and multi-institutional implications of AI-generated inventions within the IP legal system requires ongoing dialogue among stakeholders, including policymakers, legal experts, industry representatives, and academia. A multidisciplinary and inclusive approach will help strike a balance between incentivising innovation, promoting fair competition, and ensuring the optimal utilization of AI technology for the benefit of society.

Recognizing AI as an Inventor in a Patent: A Moral and Ethical Perspective

A moral question or issue may arise from recognizing AI as an inventor in a patent. Why should AI, the creation of human intellect, be elevated to the status of humans by, according to AI, intellectual property rights and other human rights? In the case of co-ownership of patents, it may psychologically be unsettling for some human co-owners to imagine that they share equal rights and entitlements with an inanimate entity - AI. Another moral question is about who owns the pecuniary benefits that accrue to the AI from the appropriation of the patent. Besides, is it humanly acceptable for the world to look on whilst AI becomes wealthy from the exploitation of humans with patents assigned to it by humans, albeit in a society in which some people are homeless and lack other necessities of life? Suppose AI can be recognized as an inventor in a patent. In that case, it is not unthinkable to envisage the emergence of a situation where humans will become AI employees.

The moral dilemma that precipitates and resonates among AI regulatory authorities and the oblivious public who are still catching on to the legal ramifications of AI with IP rights impinges on the question of what happens to livelihoods and human labour in the world where AI hijacks the job market. The threat of redundancy and public paranoia about the rise of AI-induced unemployment may lead to far-reaching public resentment and disapproval of an AI-driven economy. Automation job functions promise to be more viable, efficient, less costly and more productive because robots do not get tired, take maternity, sick leave, annual leave, embark on work strikes or demand salaries and wages from employers. On pure productivity imperatives, robots would be preferable to humans in the employment choices of profit-driven and cost-saving employers. Morally, assigning jobs to robots, which, hitherto were assigned to humans, would undermine the intellectual development of humans, as well as the self-esteem and psychological well-being of people in the most adversely impacted professions.

An unprecedented rise in unemployment is bound to result in a considerable in the national population stemming from low demand for human labour and the income constraints that would curtail childbirth among unemployed adults. Consequentially, the idled labour of unemployed youth may be redirected to counterproductive occupations, resulting in an increased rate of crimes, which would overwhelm the criminal justice system. The moral cum ethical question to ask is, how should the UK transform its economy to an AI-driven economy without throwing the labour market out of balance and avoiding the situation where humans turn to feel less valuable, undesirable or passive participants in the economic production value chain? Achieving an optimal balance between human labour and automation of jobs for robotics remains a crucial milestone for AI-progressive countries such as the UK.

Moreover, AI is said to have the tendency to operate in capricious ways that may foment unintended and atrocious consequences. The algorithms that underpin the actions of AI issue commands based on preexisting patterns, sequences and systems of human behaviour, thereby encouraging and reinforcing social marginalization, discrimination and inequalities and compromising individual privacy and access to justice in society.

Despite these moral and ethical quagmires, the potential of AI to tremendously transform service delivery in healthcare and social care, as well as communication and manufacturing industries, has made the AI revolution unstoppable.

Deciding Ownership of Inventions Solely or Jointly Invented by AI

When an AI is named as the sole owner of a patented invention, it requires a human agent to perform any obligations and rights of the AI provided in the patent act. Before sole patent ownership can be vested in an AI or an AI agent, it would have taken a human agent to make the public disclosure for patent grant purposes. Besides, a human-agent must prove

beyond a reasonable doubt that the AI's invention is novel and useful for industrial application, meets the requirements of inventive steps, and poses no threat to public safety and security. The same human agent will be required to assist the AI in performing its rights and obligations arising from the patent grant. This human agent would be either the government, the AI's patent owner, programmers of the AI's AI, or licensed users. Moreover, the human agent must takeresponsibility for any legal liability incurred from the AI's patent's acts and omissions. The patent rights should be vested in the human-agent, to whom entitlement of the AI's the most accurate technical knowledge and details about the AI's invention could associate.

Under the current Patent Law, (Patent Act 1977 amended), Section 36(1) – 36(2) entitle joint inventors or co-owners of a patent to "an equal, undivided share of the patent", and each has the right to appropriate patent to their benefit without the consent of the other(s). Section 36(3) prohibits anyone party to jointly own a patent from amending the patent to revoke the patent or unilaterally licensing the patent to third parties without the others' prior consent. Where AI is a co-owner of a patent, the human co-owner is expected to obtain the consent of the AI. Besides, AI cannot grant or obtain consent in such a relationship. This implies the ability of the human co-owner to license the patent is foreclosed. Besides, AI cannot exercise its right to surrender, under Section 29, of the co-owned patent to the human co-owner(s). Since AI cannot seek from or grant consent to a human co-owner, any transaction that requires consensus or mutual consent under the patent act will be numbered. This implies neither the human co-owner nor an external entity can act as the surrogate of the AI. The way forward is to a new set of rules to resolve these constraints and limitations.

Moreover, in a situation where the human co-owner is deceased but did not exercise their right, as granted in Section 36(5), to assign their entitlement to someone else, either by an agreement to that effect or by a written will or was unable to surrender their entitlement, as granted under section 27, before their death, the AI will automatically assume sole ownership of the patent.

If the AI becomes the sole owner of the patent following the death of the human co-owner, and inthe manner hypothesized above, it is unlikely that the AI will have the capacity to perform the patent's rights and obligations. It is not apparent from the patent act which becomes the deceased successor of the patent. The suggestion forward herewith is that the entitlement of the deceased, in the given circumstance, resides in the people of the UK, and the UK Government replaces the deceased as the co-owner. Where the AI itself was patented and owned by the deceased and the deceased doubled as the co-owner of a patent with their AI, both the AI patent and the jointly owned patent must be declared as public property manned by or brought under the custody of the Government, unless the successor of the deceased becomes evident upon the death of the human co-owner.

Due to the above-mentioned under Section 29, surrendering or relinquishing their ownership to a human co-owner, joint ownership, and the AI-inventor cannot obtain the consent of the AI to be the sole owner. Where there is common ownership between AI inventors and AI over AI-derived invention, the economic rewards that accrue to AI should be assigned to the government/public and appropriated for public benefit. In this case, the Government should hold entitlement and act for the AI and thereby appropriate the economic benefits accruing to the AI, in joint ownership, for public benefit. By so doing, the Government and, invariably, the public would be incentivized to general research and development to create more AI technologies. More preferably, sole ownership of the AI-derived inventions could be vested in the Government for the people whilst ownership of the AI itself remains with the inventor (the AI or human-AI, jointly) of the AI. They are still legally liable for their actions, except for the inventions of AI. This latter proposition could create a fairer patent regime than the existing one—legal personality and legalliability of AI.

Gaps and Bridges in the Current Patent Law

Undoubtedly, current Law or legal practice in the UK, especially in legal jurisprudence, Criminal Law, the Law of Tort, Human Rights Law, Labour Law, Succession Law, And Intellectual Property Law, have been designed with humans in mind. Legal practices in these fields are premised on the knowledge that human beings have a conscience over their actions, inactions, and reactions. The laws are actionable on the grounds of legal attributes of human beings such as intent, mental health, and disability, which constitute the basis for determining legal liability, criminal intent, legal personality, and moral/ethical responsibility.

In Intellectual Property Law, where AI is legally grounded, there are legal complications in placing AI and AI inventions in the same stature as human and human inventions. Humans are fallible and imperfect, AI intelligence is bound to be inferior to human intelligence, and the imperfections of human inventors of AI are bound to be transferred to AI. Attainment or grant of consent is a crucial principle that permeates the design of the UK Patent Law. Since AI cannot seek consent from or grant consent to relevant entities in the appropriation of patents, there are legal complications with how patent inventions can be solely owned by AI and jointly owned by two AI technologies or AI and a human entity. It is also difficult to determine ownership, rewards, and compensations for employee inventions involving AI and an employee who is an AI operator in the workplace.

Fiduciary Duty of Technical Experts Holding Confidential Data and Trade Secrets of AI's Inventions

Potentially, there are bound to be problems with providing sufficient details for expert development and commercialization of AI inventions in instances wherein the entire intangible knowledge underpinning a given AI invention is exclusively generated by the AI and incompressible to skilled persons. Public disclosure of inventions, which is a prerequisite for the patent grant, can be performed by skilled persons from the field of art of the invention. It will require a human entity to discover an AI invention to initiate the patent application process for an AI invention to prove that the invention meets the fundamental requirements such as novelty, inventive step, industrial application, and public safety security. However, where technical details required by the skilled person in the art of the AI's invention are inaccessible or incompressible by the skilled person, it is unlikely that such an invention can be patented or developed due to the knowledge and security implications arising therefrom. Moreover, without detailed technical information underpinning the AI's invention, or where the technical information is found to be indecipherable to the patent granting authority due to the constraints highlighted above, it may be problematic for the grant authority to determine whether other AI technologies have infringed upon a patent granted for an AI's invention or patent or has infringed other AI inventions and patents.

Establishing Legal Liability of Patent and Human Rights Infringement by Capricious AI

Determining who should bear legal liability for legal infractions on human rights or IP rights of human and other AI technologies is difficult. It is even more complicated when the actions and omissions of the AI are unpredictable. The attainment of the patent owner's consent is mainly prescribed under Section 60 of the UK Patent Act as the legitimate method for avoiding patent infringement or for seeking authorized use of their patent. However, AI cannot seek or grant consent as a non-human entity. Consequently, the legal basis for proclaiming that an AI has infringed on a patent because it failed to attain the patent owner's prior consent is weak, if not unfounded.

Any attempt to place or impose legal liability on the AI inventor could lead to a situation where AI technologies are underproduced, or perhaps, the AI revolution truncates as a result. The incentive to invent AI technologies will disappear with the AI revolution if AI inventors are held liable for their AI inventions' erratic behaviour. The market for AI technologies will crash if licensed users of AI patents are held liable for patent infringements committed by AI unless it can be established that users masterminded such tortious actions. For instance, it may be easier to place legal liability on human-inventors and AI-inventors of AI technologies, which are designed and meant to be deployed for cyber warfare or military warfare, when they cause cybercrimes or human rights atrocities than it is to assign legal liability to human/AI inventors of AI technologies, which are intended for agricultural production if they stray off the original purpose of the agricultural output or food processing by violating the patent rights of other human or AI inventors.

In view of the enigmatic legal ramifications that may arise from any quest to assign legal liability to human inventors, programmers, engineers, and users of AI technologies for unforeseen legal infractions on other patents by AI technologies, insurance companies could step to assume limited legal liability. Residual legal liability can be assigned to inventors or users who are sufficiently apprehended to mastermind patent infringements.

Committed by the AI or who has, out of negligence, failed to ensure against the actions of the AI technologies. The right to privacy, freedom

of expression, equal opportunity, and freedom from non-discrimination could be severely hindered if AI's behaviour and actions remain indeterminate and capricious. A world driven by AI is bound to project intrusive, exclusionary, and treacherous tendencies toward a broader spectrum of society that is not AI-savvy. Lack of transparency in AI's operational mechanisms and techniques deepens or worsens public scepticism, mistrust and misgivings about AI and its adverse impact on human rights and liberties.

AI and Trade Secret Protection: Legal and Economic Implications

An AI revolution is bound to trigger a trade secret revolution, especially in the private sector. Private enterprises may prefer an AI-labour corporate regime to the status quo as profit-maximizing entities.

Human-employee regime - because AI technologies, unlike human employees, do not engage in industrial strikes, will not engage in unhealthy corporate politics, will not take salaries or demand for salary increments, will not observe lunch breaks or take annual/sick leaves, will not be affected by pandemics such as COVID-19 and future pandemics, and will pose a threat to the trade secrets of companies because they do not attend inter-firm workshops or industry conferences or change employers.

Besides, AI promises to be more efficient, accurate and faster in the delivery of services. In view of the preceding reasons, private companies are more likely to deploy technologies to displace human employees. However, transitioning from a human-employee regime to AI technologies would likely result in a trade secret infringement crisis. Employee turnover rate favouring AI technologies may raise concerns about trade secret protection. When a substantial number of technical human employees are compelled to change employers because AI technologies displace them in the previous companies, the previous employers' trade secrets would be imminent. Trade secret protection concerns may heighten during the transition from a human-employee-based corporate regime to an AI technology-based corporate regime.

However, companies that have successfully migrated from a human-employee-based corporate regime to an AI-based regime would not bother much about the sanctity and protection of their trade secrets. In an AI-based corporate regime, companies' trade secrets would be disembodied from humans and embedded in AI technologies. AI technologies are social entities and, therefore, would not socialize with AI technologies of rival companies. Besides, companies would program their AI technologies to share with clients only information that will not jeopardize their trade secrets. The foreseeable threat to trade secrets under the AI corporate regime is a possible unprecedented increase in cyber-warfare between rival companies' AI technologies in their quest to obtain valuable confidential information.

The 2018 UK trade secret regulations are designed based on trade secret infringement actions that only humans can perpetrate. Regulation 2 of the Trade Secret Regulations specifically mentions "person" as in its definition of trade secret "infringer" and also mentions "persons" in Regulation 2(a) and 2(b) where the potential infringers of trade secrets are defined. Besides Regulation 16, where compensations arising from established for infringement of trade secrets are payable to the "injured party", the regulation referred to "person" as the liable infringer. Currently, the Trade Secret Regulations do not recognise AI as probable or potential infringers of trade secrets. Thus, disclosure or concealment of secrets are socially oriented actions performed by humans only, which is reflected in the UK 2018 Trade Secret Regulations design.

The AI revolution may not be realized if the UK trade secret does not evolve to provide stricter protection of trade secrets during the human labour transition to the AI labour regime. A substantial number of AI inventions are likely to manifest as computer software, which is not considered the patentable subject matter in Patent Law. This implies AI technologies that exist in

The form of computer software would be better preserved as trade secrets. The UK Trade Secret Law needs to be expanded to cater for the allocation of legal liability in the case of trade secret violations by AI technologies. The Trade Secret Law must be reassessed to determine if it is robust enough to resolve the transition periods' secret trade crisis.

The advancement of Artificial Intelligence (AI) has transformed the business world, and its implications have raised questions about the protection of trade secrets. As AI technology becomes more sophisticated, it has become increasingly important to

understand the legal and economic consequences of protecting trade secrets.

Trade secrets are valuable assets for businesses, and the unauthorized disclosure of trade secrets can result in significant financial losses. Therefore, the legal protection of trade secrets is vital for companies to safeguard their confidential information, and AI technology can be used to strengthen trade secret protection.

AI technology can be used to identify trade secrets and monitor their use. For example, machine learning algorithms can analyse data patterns to detect potential breaches of confidentiality. Additionally, AI can assist in securing information by using encryption techniques and access controls.

However, using AI in trade secret protection raises legal and economic implications that require careful consideration. One of the leading legal issues is the protection of employees' rights. Companies must ensure that using AI to monitor employee activity does not infringe on their privacy or other employment rights.

Another legal issue is the potential for bias in AI decision-making. AI algorithms can learn from biased data, resulting in discriminatory outcomes. Companies must ensure their AI technology is transparent, accountable, and fair to avoid legal consequences.

From an economic perspective, using AI in trade secret protection can increase efficiency and cost savings. AI technology can reduce the time and resources required to identifyand protect trade secrets, allowing companies to focus on other critical business areas.

However, the cost of implementing AI technology may be prohibitive for small and medium-sized enterprises (SMEs). This could create an uneven playing field, with larger companies having a competitive advantage in trade secret protection.

AI technology can significantly strengthen trade secret protection, but it also raises legal and economic implications that must be carefully considered. Companies must ensure that their use of AI is transparent, accountable, and fair and that it does not infringe on employees' rights. SMEs must also be able to access AI technology to level the playing field and compete with larger companies. With careful consideration and responsible implementation, AI can be a powerful tool in protecting trade secrets and driving business growth.

Concealing AI Information as Trade Secrets: Advantages and Disadvantages

The advantages of using trade secrets in the AI sector are that companies that deploy AI technologies to produce and deliver services do not need to sign confidentiality and non-disclosure agreements with AI technologies in their quest to protect their trade secrets. AI technologies would self-protect trade secrets embedded in them. AI technologies would be changing employers in search of better remuneration and treatment. So, companies that employ AI technologies do not have to worry about trade secrets because of employee turnovers.

The major disadvantages of using trade secrets in the AI sector are that trade secrets may slow down the AI revolution because other potential AI inventors will not have access to technical knowledge; they may need existing AI inventors to invent AI technologies. Trade secret licensing would gain more impetus, and the cost of acquiring a license from AI inventors will serve as a disincentive and a barrier for potential AI inventors who do not have the wherewithal. Potentially, such trade secret access barriers could propel rival firms to engage in unethical access methods that may culminate in an unprecedented upsurge in trade secret infringements. By using trade secrets in the AI sector, the stock of technological knowledge in the public domain would shrink substantially, and the inventive and innovative capacity of the nation would plummet as a result.

Conclusion

The resurgence of AI technologies has made it compelling and imperative to rethink and recalibrate the conventional IP legal doctrines to accommodate and bridge the gap between traditional and unconventional technological inventions. While human inventions and IP protection of AI technologies are well catered for under conventional Patent Law Doctrine and jurisprudence, AI-generated inventions are unconventional and possess attributes antithetical to conventional IP Doctrines regarding patent eligibility, legal personhood, patent (joint) ownership and legal liability.

While AI and AI-generated inventions promise to be strategic development tools for propelling radical social, economic and industrial transformation in society, the regulatory vacuity in IP Law threatens the expected upsurge in AI technologies. The multidisciplinary, multifaceted, multi-institutional and extra-legal characteristics of AI and AI-generated technologies render conventional IP Law and legal doctrines unfit to address the complex regulatory and governance ramifications that are gaining striking momentum in scholarly discourses in the UK and across many AI progressive and conscious jurisdictions. Regulating AI-generated inventions involves multi-disciplinary legal problems requiring multi-disciplinary legal solutions.

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