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THE ROLE OF STATUTORY LAW IN REGULATING ARTIFICIAL INTELLIGENCE: BALANCING INNOVATION AND RESPONSIBILITY

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ABSTRACT

Background: *Artificial Intelligence (AI) poses profound governance challenges, as its rapid integration across critical sectors exacerbates risks of discrimination, privacy violations, and accountability gaps. Statutory law, which traditionally underpins national legal systems, is proving increasingly insufficient to regulate the ethical, social, and economic implications of AI. Its structural rigidity, coupled with lengthy legislative processes and jurisdictional fragmentation, renders it ill-equipped to respond to the fast-evolving nature of algorithmic technologies. Consequently, regulatory gaps emerge in high-risk applications such as predictive policing, biometric surveillance, medical diagnostics, and autonomous weapons domains, where errors or biases can lead to irreversible harm. Many existing legal norms were crafted without anticipating the complexity and opacity of machine learning systems, including their potential to operate in ways that defy traditional notions of human intention, liability, and foreseeability. As a result,*

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there is an urgent need for scholarly engagement with the conceptual and practical tensions between innovation and regulation in the AI context. This includes exploring adaptive legal frameworks, hybrid governance models, and the integration of ethical principles into technological design.

Methods: *This study employs a comparative legal analysis of AI regulatory frameworks across key jurisdictions (EU, US, China, Brazil, UK), combined with doctrinal research of legislative texts and case law. The methodology integrates a systematic review of primary sources (e.g., EU AI Act, US Algorithmic Accountability Act drafts, China's GenAI Interim Measures), a qualitative assessment of secondary literature and institutional reports, application of the Issue-Rule-Application-Conclusion framework to evaluate regulatory efficacy, and a cross-jurisdictional examination of enforcement mechanisms and liability standards.*

Results and conclusions: *The analysis reveals statutory law's critical limitations, jurisdictional divergences in risk classification (e.g., the EU's ex-ante conformity assessments vs. the US's sectoral ex-post enforcement), liability fragmentation, and enforcement gaps. Crucially, statutory approaches alone cannot balance innovation promotion with ethical constraints: excessive regulation stifles R&D, while lax frameworks enable societal harm. The study concludes that effective governance requires complementary ethical frameworks that embed transparency, bias auditing, and human oversight; international harmonisation of liability standards and risk protocols; adaptive regulatory sandboxes for real-world testing; and multistakeholder collaboration to design context-sensitive implementations.*

1 INTRODUCTION

As artificial intelligence (AI) advances and its applications expand, its significance continues to grow, exerting an increasing impact on society and shaping future development.[1] The majority of economic sectors, social interactions, and technical breakthroughs are expected to depend on AI as a foundational technology. AI is fast evolving with the potential to improve business operations, enhance public safety, and contribute to broader social progress.[2] At the same time, there will be issues, some foreseen, and many that will evolve alongside the technology itself. Regulating AI through traditional governance systems is challenging due to its pervasive and evolving nature. Instead, a degree of flexibility to promote innovation while ensuring security has often been provided through a variety of "soft-law," or non-binding, instruments.

1 Yanqing Duan, John S Edwards and Yogesh K Dwivedi, 'Artificial Intelligence for Decision Making in the Era of Big Data–Evolution, Challenges and Research Agenda' (2019) 48 International Journal of Information Management 63. doi:10.1016/j.ijinfomgt.2019.01.021.

2 Daniel Castro and Joshua New, *The Promise of Artificial Intelligence* (Center for Data Innovation 2016) 32-5.

Statutory law, which is the term used for written laws passed by a legislative body, is intended to give people and organisations a framework within which it is supposed to operate. Yet the regulation of AI's development and application has become increasingly complex due to society's growing reliance.[3]

Statutory law has long served as the cornerstone of legal systems, but in the era of artificial intelligence, these shortcomings have come to attention.[4] This research will examine the limitations of statutory law in the context of AI and explore how technological advances are disrupting established legal norms. It is becoming clear that statutory law alone cannot adequately handle the ethical, societal, and economic consequences of AI.

The widespread deployment of AI across diverse industries poses pressing issues of control and governance.[5] The rapid development of AI systems frequently surpasses the creation of related legal frameworks, posing significant challenges for legislators. Efforts to establish accountability and transparency are hindered by the dynamic nature of AI algorithms, which evolve and adapt within decision-making processes.[6] Regulatory efforts are further complicated by technical challenges, including bias and interpretability.

This research seeks to explore how statutory law can be adapted to effectively regulate artificial intelligence, striking a balance between fostering technological innovation and ensuring societal responsibility, while acknowledging its inherent limitations in addressing AI's unique ethical, social, and economic challenges.

2 METHODOLOGY AND RESEARCH APPROACH

This study examines the role of statutory law in AI regulation across several jurisdictions, employing a comparative legal analysis methodology in conjunction with doctrinal research methods. To explore how various legal systems address AI governance issues, the research employs a qualitative research methodology, combining a systematic examination of legislative texts, regulatory proposals, and court rulings.

The methodological framework consists of a few essential elements. First, doctrinal legal research forms the foundation of the analysis, involving a thorough examination of primary legal sources such as laws, rules, and case law pertaining to AI governance. This method

3 Laura F Edwards, *The People and their Peace: Legal Culture and the Transformation of Inequality in the Post-Revolutionary South* (University of North Carolina Press 2014).

4 Edward L Rubin, 'Law and Legislation in the Administrative State' (1989) 89(3) Columbia Law Review 369.

5 Lawrence B Solum, 'Artificially Intelligent Law' (2019) 1 BioLaw Journal 53. doi:10.15168/2284-4503-351.

6 Araz Taeihagh, 'Governance of Artificial Intelligence' (2021) 40(2) Policy and Society 137. doi:10.1080/14494035.2021.1928377.

reveals weaknesses in existing regulatory frameworks and permits a methodical analysis of how current legal frameworks respond to emerging AI challenges. Comparative legal analysis, focusing on the European Union's AI Act in conjunction with the latest frameworks in the US, UK, Brazil, and China, offers insights into various regulatory philosophies and approaches across jurisdictions.

The research methodology also incorporates analysis of secondary sources, including academic literature, policy documents, and industry reports, to provide contextual understanding of regulatory challenges and opportunities. This multi-source approach ensures comprehensive coverage of both theoretical frameworks and practical implementation challenges in AI regulation. The IRAC method (Issue, Rule, Application, and Conclusion) is used as an analytical framework to structure the legal analysis and ensure systematic examination of AI regulatory challenges.

Data collection was conducted through a systematic review of legislative texts, regulatory proposals, and academic commentary published between 2018 and 2024. This temporal scope was selected to encompass the most significant period of AI regulatory development globally, beginning with the European Union's initial AI regulatory proposals and extending to recent legislative initiatives in multiple jurisdictions.

3 HISTORICAL CONTEXT AND LEGISLATIVE EVOLUTION

Throughout history, the development of AI has been influenced by broader socio-political and economic environments, which in turn have shaped public attitudes and governmental responses. Early debates surrounding AI centred on how society would change as a result of it; however, concerns about job displacement and ethical dilemmas soon emerged, particularly in relation to productivity gains.

Changes in the availability of legal information have had an impact on the evolution of the legal services delivery system. With the invention of the CD-ROM in the 1990s, the use of digital resources and libraries gained momentum in the process of evolution.[7] Today, nearly all law firms rely on digital legal materials.[8] Predictive algorithms represent the most recent stage of this evolution, enabling lawyers to navigate complex legal dilemmas and identify and synthesise relevant information.

7 Ansgar Koene and others, *A Governance Framework for Algorithmic Accountability and Transparency* (EU 2019). doi:10.2861/59990.

8 George Stachokas, *The Role of the Electronic Resources Librarian* (Chandos 2019). doi:10.1016/C2018-0-02157-X.

Computer-assisted legal research, pioneered by Westlaw and Lexis in 1976, has become a cornerstone of legal practice. Most legal research is now conducted online,[9] replacing reliance on physical libraries. Digital access to legal texts allows attorneys to locate pertinent sources through keyword searches, significantly reducing the time once required to manually consult indices and read through each source individually.[10] While larger institutions rely heavily on proprietary data providers such as Westlaw, Lexis, or Bloomberg, others turn to publicly available sources.[11]

Traditionally, lawyers have been regarded as highly competent individuals trained to identify the relevant facts, frame pertinent legal issues, and predict the likely outcome of the case.[12] Attorneys apply judgment to evaluate the merits of a case and determine the best course of action by drawing on expertise and intuition. For a long time, such tasks were considered the exclusive domain of highly qualified specialists/ lawyers.

However, modern advances in AI have challenged long-held beliefs about human knowledge, particularly in the areas of machine learning and natural language processing. It is clear that the impact of data-driven analysis extends to the practice of law.[13] Litigation itself is gradually evolving, with disputes increasingly being resolved "in the shadow of the law", where settlement outcomes are shaped by the likely decision a court would reach. Predictions made by algorithms are repeatable by others.

The legislative development of AI can be traced through a series of significant events in several countries. Early regulations sought to advance R&D while maintaining ethical and safety standards. As AI applications spread across several industries, regulators faced new challenges concerning algorithmic transparency, cybersecurity, and data privacy.[14] In response, legislative solutions have been progressively updated to consider new dangers and public concerns. The definition of AI itself has remained fluid, shifting with technological advances.[15] In recent years, there has been a growing number of measures

9 Richard Susskind and Richard E Susskind, *Tomorrow's Lawyers: An Introduction to your Future* (OUP 2023).

10 Samuel Maireg Biresaw, 'The Impacts of Artificial Intelligence on Research in the Legal Profession' (2023) 5(1) International Journal of Law and Society 53. doi:10.11648/j.ijls.20220501.17.

11 F Allan Hanson, 'From Key Numbers to Keywords: How Automation Has Transformed the Law' (2002) 94 Law Library Journal 563.

12 Taryn Marks, 'John West and the Future of Legal Subscription Databases' (2015) 107(3) Law Library Journal 377. doi:10.2139/ssrn.2441734.

13 Cass R Sunstein, *Legal Reasoning and Political Conflict* (OUP 2018).

14 Melanie Mitchell, *Artificial Intelligence: A Guide for Thinking Humans* (Penguin UK 2019).

15 Peter Cihon, 'Standards for AI Governance: International Standards to Enable Global Coordination in AI Research & Development' (*Centre for the Governance of AI (GovAI)*, 17 April 2019) <https://www.governance.ai/research-paper/standards-for-ai-governance-international-standards-to-enable-global-coordination-in-ai-research-development> accessed 20 April 2025. ; Tarek Abo El-Wafa, 'The Jurisdiction of the UAE Federal Supreme Court on Constitutional Interpretation' (2021) 38(1–2) Arab Law Quarterly 192. doi:10.1163/15730255-bja10098.

to improve algorithmic accountability and transparency, including inquiries for regulatory monitoring of AI systems, particularly in high-stakes sectors such as criminal justice, finance, and healthcare.[16]

China's AI regulatory framework emphasises enhancing norms for scientific and technological ethics, focusing on data security protection systems and balancing fair competition with innovation encouragement. It addresses ethical concerns, attribution of liability, and the prevention of intellectual property monopolies. A central component is the *Interim Administrative Measures for Generative Artificial Intelligence Services,*[17] which plays a key role in ensuring governance mechanisms work together to build trust and accountability in the AGI industry.[18]

Nevertheless, China's current AI regulatory framework remains limited in scope, particularly in its lack of comprehensive definitions and protections for data rights. While it underscores the need for specialised intellectual property protection for data and the adoption of anti-monopoly measures to prevent misuse and monopolistic practices, it does not provide a fully developed legal framework. A more legal framework—one that recognises data as a form of intellectual property, acknowledges its dual public and proprietary nature, and strengthens digital IP protections alongside ethical guidelines for AI—is still needed.[19]

Brazil's approach is primarily outlined in Bill 21/2020,[20] which sets out the objectives and foundational principles for the development and use of AI, including ethical considerations. However, the bill does not explicitly regulate data privacy or intellectual property. Critics argue that its abstract provisions and limited number of articles risk overlooking essential aspects such as data protection and ethical guidelines, necessitating further discussion and refinement in the Senate.[21]

16 Sofia Samoili and others, *AI Watch: Defining Artificial Intelligence 2.0* (Publications Office of the EU 2021). doi:10.2760/01990.

17 Cybersecurity Administration of China and others, 'Interim Administrative Measures for Generative Artificial Intelligence Services' (13 July 2023) <https://www.cac.gov.cn/2023-07/13/c_1690898327029107.htm> accessed 20 April 2025.

18 Niklas Kossow, Svea Windwehr and Matthew Jenkins, *Algorithmic Transparency and Accountability* (Transparency International 2021).

19 Bing Chen and Jiaying Chen, 'China's Legal Practices Concerning Challenges of Artificial General Intelligence' (2024) 13(5) Laws 60. doi:10.3390/laws13050060.

20 Brazil Bill 21/2020 'On a Legal Framework for Artificial Intelligence' (4 February 2020) <https://digitalpolicyalert.org/change/621-bill-2120-on-a-legal-framework-for-artificial-intelligence> accessed 20 April 2025.

21 Xiao Han and Nabeel Mahdi Althabhawi, 'Establishment of Data Intellectual Property Rights and Anti-Monopoly Regulation in China' (2024) 34(2) Jurnal Undang-Undang dan Masyarakat 190. doi:10.17576/juum-2024-3402-13.

While previous sections outlined individual jurisdictional approaches, a systematic comparison reveals fundamental divergences in how major economies balance innovation and responsibility through statutory frameworks:

The EU's AI Act (2024)[22] exemplifies a risk-based hierarchical model that prohibits unacceptable practices, such as social scoring and imposes stringent ex-ante requirements for high-risk systems, including conformity assessments and fundamental rights impact evaluations. Unlike the US's sectoral approach, the EU centralises enforcement through a European AI Office, creating uniform compliance burdens. Critics argue this may stifle startups lacking resources for compliance,[23] while proponents highlight its strong emphasis on safeguarding fundamental rights.

By contrast, the US regulates AI through fragmented sectoral agencies such as the FTC, FDA, and NTSB, relying largely on non-binding frameworks like the NIST AI RMF and the Blueprint for an AI Bill of Rights. Proposed legislation, such as the Algorithmic Accountability Act (2023)[24], focuses narrowly on impact assessments in specific contexts such as hiring and housing. This avoids EU-style centralised burdens but creates regulatory uncertainty and enforcement gaps. Further, state-level initiatives—such as California's AB 331—push stricter rules, risking a fragmented "patchwork" regime. The absence of federal AI liability laws leaves accountability reliant on tort law, creating ambiguity for autonomous systems.

China's approach merges aggressive state investment in AI R&D with strict control mechanisms, exemplified by the Generative AI Interim Measures (2023). Its "negative list" system prohibits challenges to state authority while promoting industrial dominance in non-sensitive sectors. Unlike Western models that prioritise individual rights, China emphasises data sovereignty, social stability, and alignment with "socialist core values." This facilitates rapid scaling of state-approved innovations but restricts algorithmic transparency and independent oversight.

Brazil's Bill 21/2020 mirrors EU principles (human oversight, non-discrimination) but lacks implementation mechanisms. The bill coexists with the LGPD (GDPR-inspired data law), creating potential conflicts between data minimisation and AI training needs. More broadly,

22 Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act) (Text with EEA relevance) [2024] OJ L 1689/1 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32024R1689> accessed 20 April 2025.

23 Michael Veale and Frederik Zuiderveen Borgesius, 'Demystifying the Draft EU Artificial Intelligence Act' (2021) 22(4) Computer Law Review International 97.

24 US 2892 Algorithmic Accountability Act (21 September 2023) <https://www.congress.gov/bill/118th-congress/senate-bill/2892> accessed 20 April 2025.

emerging economies often adopt EU-style principles but encounter capacity gaps in enforcement. In several cases, such as India's Digital India Act, governments prioritise "sovereign AI" infrastructure over ethics frameworks, reflecting divergent innovation-responsibility weightings.

4 ROLE OF STATUTORY LAW IN REGULATING ARTIFICIAL INTELLIGENCE

International cooperation in AI governance increasingly centres on initiatives to establish technological and ethical standards that ensure the responsible development and application of AI systems.[25] Organisations, including the International Telecommunication Union, the International Organisation for Standardisation, and the Organisation for Economic Co-operation and Development, have undertaken initiatives to create AI guidelines, standards, and principles that support accountability, openness, equity, and user-centred design.

Within this global landscape, statutory law outlines rules for the creation, implementation, and use of AI systems. It provides a legal framework within which individuals and organisations operate and serves several key regulatory functions.[26] First, clear guidelines and norms for the creation and use of AI systems are one of the key functions of statutory law in regulating the emerging technologies.[27] To ensure that AI systems do not endanger the public's health or safety, statutory law can set minimal safety criteria.[28] To further ensure that personal information and civil liberties are recognised, it can also establish rules for the gathering and use of data in AI systems.[29]

The function of statutory law includes regulating AI-systems by emphasising their liability and accountability.[30] If an AI system affects someone, the creator, the user, or the AI system

25 Mayara Rayssa da Silva Rolim, Daniella Maria dos Santos Dias and Gabriel Napoleão Velloso Filho, 'Regulation of Algorithms in Artificial Intelligence Systems: A Possible Proposal for Brazil?' (2024) 17(2) Contribuciones a Las Ciencias Sociales e4924. doi:10.55905/revconv.17n.2-006.

26 Cihon (n 17).

27 Benjamin Myles Cheatham, Kia Javanmardian and Hamid Samandari, 'Confronting the Risks of Artificial Intelligence' (2019) 2 McKinsey Quarterly 38.

28 Alan FT Winfield and Marina Jirotka, 'Ethical Governance is Essential to Building Trust in Robotics and Artificial Intelligence Systems' (2018) 376(2133) Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 20180085. doi:10.1098/rsta.2018.0085.

29 Andrea Romaoli Garcia, 'AI, IoT, 'Big Data, and Technologies in Digital Economy with Blockchain at Sustainable Work Satisfaction to Smart Mankind: Access to 6th Dimension of Human Rights' in Nuno Vasco Moreira Lopes (ed), *Smart Governance for Cities: Perspectives and Experiences* (Springer 2020) 83. doi:10.1007/978-3-030-22070-9_6.

30 Alessandro Mantelero and Maria Samantha Esposito, 'An Evidence-Based Methodology for Human Rights Impact Assessment (HRIA) in the Development of AI Data-Intensive Systems' (2021) 41 Computer Law & Security Review 105561. doi:10.1016/j.clsr.2021.105561. Tarek Abo El-Wafa, Ahmed Khalil and Adham Hashish, 'Parliamentary question: Insights from the Federal National Council in the UAE' (2024) 10(6) *Heliyon* e27671. doi:10.1016/j.heliyon.2024.e27671.

itself could all be held accountable according to statutory law.[31] This is particularly crucial when AI systems are applied in high-risk industries, such as healthcare or transportation.[32]

Statutory law also contributes to limiting the impact of AI on employment and the economy. To prevent discrimination, statutory legislation should explore rules for the application of AI to hiring and promotion decision-making processes. Additionally, it can establish rules for the application of AI in fields where job displacement is a concern.

4.1. Statutory Laws and Their Limitations

The limitations of statutory law in addressing challenges posed by AI have come to light. As AI systems grow in complexity and autonomy, their regulation becomes more difficult.[33] It might equally be challenging for regulators to comprehend how they operate or recognise possible concerns.[34] Considering how quickly AI technology is developing, it is challenging for statutory law to keep up with and adjust to new advances.[35]

In principle, rules should be relied upon to regulate human conduct, as the law must strike a balance between flexibility, certainty, and reliability. Compared to principles, rules are more definite and easier to apply consistently. Law remains one of society's most crucial instruments for shaping behaviour, offering rewards for certain actions and penalties for others, influencing the creation of social institutions.

However, the law can also distort individual decision-making. While awareness of legal consequences can be helpful, it may constrain a person's ability to act in a way that reflects their genuine preferences, moral convictions, and economic interests. An overemphasis on legal compliance risks fostering excessive strategic thinking and manipulative conduct. Ultimately, this is damaging to psychological well-being, distributive fairness, autonomy, and efficiency. Achieving an optimal equilibrium between the law's beneficial function and its potential to distort behaviour is a challenging matter.

Insolvency law provides an example where concealment of legal rules is sometimes justified due to ex-ante strains.[36] When taking out a loan and investing its proceeds,

31 Bernd W Wirtz, Jan C Weyerer and Benjamin J Sturm, 'The Dark Sides of Artificial Intelligence: An Integrated AI Governance Framework for Public Administration' (2020) 43(9) International Journal of Public Administration 818. doi:10.1080/01900692.2020.1749851.

32 Shlomit Yanisky-Ravid, 'Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era: The Human-like Authors Are Already Here: A New Model' [2017] Michigan State Law Review 659. doi:10.2139/ssrn.2957722.

33 Amy Rankin and others, 'Resilience in Everyday Operations: A Framework for Analyzing Adaptations in high-Risk Work' (2014) 8(1) Journal of Cognitive Engineering and Decision Making 78. doi:10.1177/1555343413498753..

34 Duan, Edwards and Dwivedi (n 1).

35 Matthew U Scherer, 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) 29(2) Harvard Journal of Law & Technology 353. doi:10.2139/ssrn.2609777.

36 Richard M Re and Alicia Solow-Niederman, 'Developing Artificially Intelligent Justice' (2019) 22 Stanford Technology Law Review 242.

debtors bear full responsibility for repayment obligations.[37] However, if unable to repay, the law offers relief through various legal solutions to the creditor. If debtors were fully aware of these remedies beforehand, their behaviour might become more opportunistic or uncertain. In such cases, shielding the specifics of ex post legal remedies can be justified to preserve responsibility and fairness.

There can never be a definitive settlement of the relative jurisdictions of legislators and courts. Like other aspects of political organisation, this relationship is open to ongoing interpretation and discussion. In substantive criminal law, three principles govern the relationship between legislatures and courts: the legality principle, or nulla poena sine lege;[38] the constitutional theory of void-for-vagueness;[39] and the principle of strict construction, which dictates that courts must always construe criminal statutes in a way that favours the accused when there is any remaining ambiguity. Taken as a whole, these principles reflect a cautious approach to judicial lawmaking, limiting the judiciary's role in the creation of criminal law.

At the same time, AI underscores the importance of aligning legal systems with social considerations and public policy goals.[40] The societal influence of AI is intricate and calls for a wide range of public policy solutions, from employment prospects to ethical issues. One major concern is the disruption of labour markets, which has sparked conversations about workforce transition plans, universal basic income, and retraining initiatives. Equity and fairness are often compromised by AI-driven algorithms, leading to issues of prejudice, discrimination, and unequal access to opportunities.

The formulation of laws regulating AI is complicated by the inherent restrictions imposed by statutory law.[41] While statutory law is intended to give people and organisations a framework within which to operate,[42] it may not always be able to foresee the particular difficulties brought on by innovative and quickly developing AI technology. Therefore, legal loopholes frequently emerge, undermining the effectiveness of statutory regulation and necessitating supplementary reforms.[43]

37 Sandeep Gopalan and Michael Guihot, 'Recognition and Enforcement in Cross-Border Insolvency Law: A Proposal for Judicial Gap-Filling' (2015) 48 Vanderbilt Law Review 1225.

38 George G Triantis, 'Theory of the Regulation of Debtor-in-Possession Financing, A' (1993) 46 Vanderbilt Law Review 901.

39 Paul H Robinson, 'Fair Notice and Fair Adjudication: Two Kinds of Legality' (2005) 154 University of Pennsylvania Law Review 335.

40 Peter L Strauss, 'Legislative Theory and the Rule of Law: Some Comments on Rubin' (1989) 89 Columbia Law Review 427.

41 Mihail C Roco and William S Bainbridge, 'The New World of Discovery, Invention, and Innovation: Convergence of Knowledge, Technology, and Society' (2013) 15 Journal of Nanoparticle Research 1946. doi:10.1007/s11051-013-1946-1.

42 Scherer (n 37).

43 Ruth Suseela Meinzen-Dick and Rajendra Pradhan, *Legal Pluralism and Dynamic Property Rights* (CAPRi Working Paper no 22, International Food Policy Research Institute 2002).

The rise of AI presents a variety of challenges to conventional legal systems.[44] AI is increasingly applied in decision-making processes such as personnel selection, credit assessment, and aspects of legal analysis. However, these applications raise serious concerns about accountability, transparency, and fairness.[45] More innovative applications—such as driverless cars, AI-powered medical diagnostics, and autonomous drones—introduce regulatory questions that conventional legislation might not be able to handle as AI technologies advance and diversify. For example, the deployment of autonomous vehicles highlights unresolved issues regarding responsibility, safety requirements, and regulatory oversight, since current transportation laws do not adequately account for their unique capabilities and difficulties.

The broad application of AI in a variety of industries, such as healthcare, banking, and criminal justice, highlights the necessity of industry-specific laws designed to handle risks and issues unique to each industry.[46] However, the fragmented nature of regulatory initiatives, combined with the rapid pace of technological advancement, can lead to gaps and inconsistencies that undermine effective enforcement. Moreover, the global nature of AI development and application complicates governance:[47] diverging national frameworks and standards risk creating obstacles to innovation and interoperability. This makes international cooperation and harmonising regulatory frameworks essential for closing legal loopholes and ensuring accountability, safety and fairness in the use of AI technologies.

A fundamental limitation of statutory law is its reactive character. Statutory laws typically emerge in response to an existing issue or problem, which makes them resistant to adapting proactively to new developments. AI presents particular challenges in this regard: as AI evolves rapidly, new ethical and legal concerns continually emerge, often faster than legislatures can respond. Consequently, statutory law risks lagging behind technological change, leaving legal systems unprepared to address the unique issues brought on by the usage of AI.

The disadvantage of statutes is that they are often overly restrictive. Although statutory law is intended to be broadly applicable across a range of scenarios, this generality can make it difficult to address specific situations. This is particularly problematic for AI, which is routinely used in varied situations that do not neatly align with established legal frameworks.

44 Miriam C Buiten, 'Towards Intelligent Regulation of Artificial Intelligenceبمعه' (2019) 10(1) European Journal of Risk Regulation 41.

45 Paulius Čerka, Jurgita Grigienė and Gintarė Sirbikytė, 'Liability for Damages Caused by Artificial Intelligence' (2015) 31(3) Computer Law & Security Review 376. doi:10.1016/j.clsr.2015.03.008.

46 Corinne Cath, 'Governing Artificial Intelligence: Ethical, Legal and Technical Opportunities and Challenges' (2018) 376(2133) Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 20180080. doi:10.1098/rsta.2018.0080.

47 Shalini Rai, 'Legal Liability Issues and Regulation of Artificial Intelligence' (thesis, 2022).

Statutory law frequently faces limitations arising from its dependence on human interpretation. Because laws are expressed in natural language, they are inherently open to multiple interpretations.[48] This limitation is particularly salient in the context of AI, where algorithmic decisions can be difficult to understand or explain, potentially producing inconsistent and ambiguous legal outcomes. In *State v. Loomis*, the Wisconsin Supreme Court acknowledged the defendant's challenge to the use of the COMPAS risk assessment algorithm in sentencing. While upholding its use, the court mandated specific warnings for judges, highlighting judicial recognition of statutory law's struggle with algorithmic opacity and potential bias.[49] It may be challenging to prove that these biases exist, though, given the often inaccessible nature of AI decision-making processes.

The rigidity and constrained nature of statutory law are key factors limiting its ability to address the ethical and moral implications of AI.[50] Legal systems often struggle to keep pace with the remarkable rate at which AI technologies are developing,[51] and the inflexible terminology of statutes may not take unforeseeable events or the broader ethical ramifications of AI into account.[52]

Statutory law also relies heavily on human interpretation, which can be perplexing or unpredictable in situations involving intricate moral and ethical dilemmas.[53] Different interpreters may reach divergent conclusions, resulting in inconsistent or contradictory applications of the law.[54] Furthermore, statutory law typically concentrates on addressing certain problems, whereas AI has the potential to impact multiple facets of society.[55] This means that the profound ethical and moral consequences of AI may not be fully addressed.

The regulation of AI through statutory legislation faces a number of restrictions. Some of these restrictions include:

1) **Lack of clarity**: Terms associated with AI, such as machine learning algorithms, neural networks, and deep learning, often lack precise legal definitions, making it challenging to apply existing statutes to developing technology.

48 Taeihagh (n 8).
49 Mark Greenberg, 'Legal Interpretation and Natural Law' (2020) 89(1) Fordham Law Review 109.
50 *State v Loomis* 881 NW2d 749 [2016] Supreme Court of Wisconsin.
51 Olivia J Erdélyi and Judy Goldsmith, 'Regulating Artificial Intelligence: Proposal for a Global Solution' (AIES '18: AAAI/ACM Conference on AI, Ethics, and Society, New Orleans LA USA, 2-3, February 2018) 95.
52 Yogesh K Dwivedi and others, 'Artificial Intelligence (AI): Multidisciplinary Perspectives on Emerging Challenges, Opportunities, and Agenda for Research, Practice and Policy' (2021) 57 International Journal of Information Management 101994. doi:10.1016/j.ijinfomgt.2019.08.002.
53 Margarita Robles Carrillo, 'Artificial Intelligence: From Ethics to Law' (2020) 44(6) Telecommunications Policy 101937. doi:10.1016/j.telpol.2020.101937.
54 Scherer (n 37).
55 Ken Kress, 'Legal indeterminacy' (1989) 77(2) California Law Review 283. doi:10.15779/Z380B17.

2) **Slow legislative process:** Enacting or amending statutes is typically a lengthy process. Consequently, statutory law often lags behind the rapid development of AI, creating regulatory gaps and loopholes.

3) **Limited application:** Statutory law often focuses on particular regulatory areas, such as liability, security, or privacy. This narrow focus may not be sufficient to address the complex and numerous problems that arise from the creation and application of AI.

4) **Inflexibility**: Once enacted, statutes can be difficult to amend or modify. This rigidity hinders timely responses to new and developing AI-related concerns, and the variation between national legal systems can complicate efforts to regulate AI on a global level.

5) **Enforcement challenges**: Enforcing statutory law can be challenging, particularly in the age of rapidly developing technologies like artificial intelligence. The complexity of AI systems, combined with ambiguities in existing legal provisions, can make it challenging to identify and hold violators accountable.

4.2. The Difficulties of Juggling Innovation and Responsibility

One of the central challenges in balancing innovation and accountability in AI governance is promoting the development of AI technologies while ensuring their use is responsible and ethical. [56]This entails addressing the statutory law's restrictions on the regulation of AI, the quick advancement of technology, and the broader moral, societal and economic implications of AI.

Three foundational arguments underlie key legal doctrines, including the vagueness theory, the rule of rigid construction, and nulla poena sine lege.[57] First, judicial innovation is rendered illegitimate when popular sovereignty is linked to legislative supremacy, reflecting the principle of "separation of powers" in modern constitutionalism. Second, it is unfair to penalise behaviour that was not previously classified as criminal, emphasising "notice" and "fair warning". Third, concerns about biased or arbitrary application of the criminal code highlight the importance of legal formalism in constraining unchecked discretion.

The so-called "rule of law" underlies both the vagueness theory and *nulla poena sine lege*. Yet there is danger in invoking this term, as it has become a highly malleable political catchphrase. Too often, the rule of law is conflated with the rule of good law, turning it into a blanket assertion of virtue within a legal framework. Legal theorists and philosophers,

56 Abdulfattah Yaghi, Tarek Abo El-Wafa and Ali A Al Ahbabi, 'Exploration of principal–agent theory in a consultative policy-making context' (2025) 12 *Humanities and Social Sciences Communications* 1419. doi:10.1057/s41599-025-05648-4.

57 Bruce G Buchanan and Thomas E Headrick, 'Some Speculation about Artificial Intelligence and Legal Reasoning' (1970) 23(1) Stanford Law Review 40. doi:10.2307/1227753.

however, have developed the idea in unduly complex ways. At its core, the prohibition of arbitrary behaviour in the use of state power is symbolised by the rule of law. In the context of criminal law, it requires that agents of official coercion, to the extent possible, act in accordance with established rules—that is, publicly recognised, reasonably stable, and broadly applicable declarations of prohibited behaviour by the state.

The economic impact of AI is another critical factor shaping industrial and societal development. AI integration can enhance productivity and foster innovation, but it also raises challenges pertaining to competitiveness, market dynamics, and regulatory control. Automation has the potential to transform the labour market, triggering issues such as job displacement, the need for skill retraining, and income inequality. At the same time, AI raises significant ethical and societal concerns, particularly when algorithms are used to make judgments in hiring, credit or criminal justice. Bias in algorithmic decision-making can have profound effects on people and communities.

The key considerations for AI governance are described below:

4.2.1. Privacy & Social Implications

Privacy is a critical area of concern that deserves attention while developing AI.[58] As machine learning algorithms evolve, they have the capacity to collect, analyse, and store vast amounts of personal data, raising questions about how such data is used and safeguarded.[59] This issue is particularly acute in healthcare, where AI is being applied to create innovative treatments and actions, creating concerns about the security and privacy of patient data.[60]

The ethical governance of AI is further complicated by the limitations of statutory law. While statutory frameworks provide a structured environment in which people and organisations can function, they may be inadequate to address the unique ethical challenges posed by AI.[61] Emerging AI systems can generate new types of harm that aren't protected by current legal frameworks, or they could cause concerns about the accountability and duty of those who utilise AI.[62] The ability of AI technologies to make

58 John Calvin Jeffries Jr, 'Legality, Vagueness, and the Construction of Penal Statutes' (1985) 71(2) Virginia Law Review 189. doi:10.2307/1073017.

59 Yi Zhang and others, 'Ethics and Privacy of Artificial Intelligence: Understandings from Bibliometrics' (2021) 222(24) Knowledge-Based Systems 106994. doi:10.1016/j.knosys.2021.106994.

60 Michael I Jordan and Tom M Mitchell, 'Machine Learning: Trends, Perspectives, and Prospects' (2015) 349(6245) Science 255. doi:10.1126/science.aaa841.

61 Richard J Chen and others, 'Synthetic Data in Machine Learning for Medicine and Healthcare' (2021) 5(6) Nature Biomedical Engineering 493. doi:10.1038/s41551-021-00751-8.

62 Cass R Sunstein, 'On the Expressive Function of Law' (1996) 144(5) University of Pennsylvania Law Review 2021. doi:10.2307/3312647.

choices and forecasts without human input introduces complex ethical dilemmas,[63] particularly related to privacy, bias, and discrimination.[64]

AI systems often process extensive personal datasets, including biometric data, location data, and browser history, to generate predictions and judgments about individuals.[65] Without people's awareness or consent, this data can be gathered and utilised, raising privacy, security and monitoring concerns.

4.2.2. Bias and Discrimination Concerns

Machine learning algorithms can be trained on biased datasets, which may result in biased projections and conclusions, raising issues about prejudice and discrimination.[66] Such biases can disproportionately affect particular groups, including minorities or people with disabilities. Judicial awareness of the tension between technological tools and fairness is evident in cases such as *State v. Loomis* (Wisconsin) and *Commonwealth v. Scantling* (Massachusetts), where courts grappled with the admissibility and fairness of algorithmic risk assessment tools in criminal sentencing, directly confronting the bias and responsibility challenges inherent in AI adoption.[67]

Effective AI governance necessitates the implementation of risk evaluation and compliance applications, enabling businesses to recognise, reduce, and manage risks posed by AI technologies while maintaining compliance with legal and ethical obligations. Risk assessment involves systematically evaluating possible hazards and weaknesses throughout the AI lifecycle—from data collection and model development to deployment and operation. This process locates sources of potential harm, including algorithmic bias, security flaws, data privacy violations, and unintended consequences, and evaluates their likelihood and potential impacts on relevant parties.

Another concern is the potential for AI systems to cause harm to people or society.[68] For instance, AI-powered medical diagnosis systems may generate false diagnoses, which

63 Nithesh Naik and others, 'Legal and Ethical Consideration in Artificial Intelligence in Healthcare: Who Takes Responsibility?' (2022) 9 Frontiers in Surgery 266. doi:10.3389/fsurg.2022.862322.

64 Thomas Davenport and others, 'How Artificial Intelligence Will Change the Future of Marketing' (2020) 48 Journal of the Academy of Marketing Science 24. doi:10.1007/s11747-019-00696-0.

65 Syeda Faiza Nasim, Muhammad Rizwan Ali and Umme Kulsoom, 'Artificial Intelligence Incidents & Ethics a Narrative Review' (2022) 2(2) International Journal of Technology, Innovation and Management 52. doi:10.54489/ijtim.v2i2.80.

66 Jeroen Van den Hoven and others, 'Privacy and Information Technology', *Stanford Encyclopedia of Philosophy* (2014) <https://plato.stanford.edu/entries/it-privacy/> accessed 20 April 2025.

67 Jessica K Paulus and David M Kent, 'Predictably Unequal: Understanding and Addressing Concerns that Algorithmic Clinical Prediction May Increase Health Disparities' (2020) 3(1) NPJ Digital Medicine 99. doi:10.1038/s41746-020-0304-9.

68 *State v Loomis* (n 51); *Commonwealth v Scantling* 24 NE 3d 1064 [2015] Supreme Judicial Court of Massachusetts.

could potentially harm patients. Similarly, autonomous weapons systems by AI have the potential to make fatal judgments without human intervention, raising questions regarding ethics and morality.[69]

The intersection of human rights and AI regulation has become increasingly critical, as AI technologies pose significant challenges to fundamental human rights like privacy, freedom of speech, equality before the law, and access to justice. Ensuring that AI development and deployment conform to the basic principles of human rights, particularly as AI becomes more integral to the criminal justice system, healthcare system, workplaces, and social services.

Concerns have arisen regarding the potential for AI systems to reinforce or amplify biases and inequities at the junction of human rights. The tension between AI deployment and fundamental rights is starkly illustrated in pending cases before international bodies. For instance, in *AlgorithmWatch Schweiz and others v. Switzerland* before the European Court of Human Rights, the plaintiffs challenge the lack of human review and transparency in fully automated systems used for significant public decisions. This case tests the boundaries of Article 8 (Privacy) and Article 6 (Fair Trial) of the European Convention on Human Rights.[70] AI algorithms trained on biased data may generate discriminatory outcomes, potentially resulting in unfair treatment and infringements on people's rights to equal protection under the law.

4.2.3. Economic Repercussions

Technology based on AI can drastically change a number of industries and open up new business opportunities,[71] but it also prompts questions regarding the economic effects of its creation and application, notably with regard to the loss of jobs and the concentration of wealth.

AI can automate many operations currently performed by humans, leading to significant job displacement,[72] especially in industries that involve repetitive tasks, such as manufacturing or data entry. Businesses that successfully adapt and use AI technology may experience an increase in productivity and profitability, potentially increasing wealth and market domination.[73] However, this may exacerbate economic inequality, concentrating wealth among a small number of businesses and individuals.

69 Andreas Kaplan and Michael Haenlein, 'Rulers of the World, Unite! The Challenges and Opportunities of Artificial Intelligence' (2020) 63(1) Business Horizons 37. doi:10.1016/j.bushor.2019.09.003.

70 Sabriya Alam and others, 'Unmanned and Autonomous Weapons Systems: Practices and Related Policy' (2020) 2(1) PPRI Student Papers in Public Policy 7.

71 *AlgorithmWatch Schweiz and others v Switzerland* App no 52652/21 (ECtHR, 24 January 2023).

72 Dwivedi (n 54).

73 Thomas H Davenport and Rajeev Ronanki, 'Artificial Intelligence for the Real World' (2018) 96(1) Harvard Business Review 108.

The economic impact of AI extends beyond particular businesses or industries. Widespread use of AI may have macroeconomic implications, including shifts in the labour market, changes in supply and demand, and variations in rates of economic expansion.[74]

AI also challenges the traditional legal framework by generating new kinds of data and information.[75] Existing statutory laws often struggle to anticipate emerging issues in areas such as intellectual property, privacy, and data protection, which may therefore be overlooked and inadequately addressed.[76]

Furthermore, AI has the potential to cast doubt on accountability under the law.[77] For example, it might not be apparent who is legally accountable for the harm caused if a medical diagnosis system powered by artificial intelligence makes a wrong diagnosis,[78] creating ambiguity and misunderstanding that statutory law may not be equipped to resolve.[79] High-profile cases, such as *Waymo LLC v. Uber Technologies, Inc.,* though settled, underscore the complex liability and intellectual property challenges arising from rapid AI development, particularly in self-driving car systems, and highlight the difficulty statutory frameworks face in definitively assigning responsibility.[80]

The fast pace and increasing complexity of AI development make it challenging for policymakers and legal professionals to enact laws capable of effectively governing AI creation and deployment.[81]

74 Spyros Makridakis, 'The Forthcoming Artificial Intelligence (AI) Revolution: Its Impact on Society and Firms' (2017) 90 Futures 46. doi:10.1016/j.futures.2017.03.006.

75 Richard B Freeman, 'Labour Market Institutions Without Blinders: The Debate Over Flexibility and Labour Market Performance' (2005) 19(2) International Economic Journal 129. doi:10.1080/10168730500080675.

76 Dirk Helbing, 'Societal, Economic, Ethical and Legal Challenges of the Digital Revolution: From Big Data to Deep Learning, Artificial Intelligence, and Manipulative Technologies' in Dirk Helbing (ed), *Towards Digital Enlightenment* (Springer 2019) 47. doi:10.1007/978-3-319-90869-4_6.

77 William M Landes and Richard A Posner, *The Economic Structure of Intellectual Property Law* (Harvard UP 2003).

78 Marten Risius and Kai Spohrer, 'A Blockchain Research Framework: What We (don't) Know, Where We Go from Here, and How We Will Get There' (2017) 59 Business & information systems engineering 385.

79 Stacy M Carter and others, 'The Ethical, Legal and Social Implications of Using Artificial Intelligence Systems in Breast Cancer Care' (2020) 49 The Breast 25. doi:10.1016/j.breast.2019.10.001.

80 Sara Gerke, Timo Minssen and Glenn Cohen, 'Ethical and Legal Challenges of Artificial Intelligence-Driven Healthcare' in Adam Bohr and Kaveh Memarzadeh (eds), *Artificial Intelligence in Healthcare* (Academic Press 2020) 295. doi:10.1016/B978-0-12-818438-7.

81 Case No 17-CV-00939-WHA *Waymo LLC v Uber Technologies, Inc*, Settlement Order (ND Cal, 7 February 2018).

5 LIMITATIONS OF LEGAL POLICIES IN REGULATING DEVELOPMENTS OF AI

Two considerations must be mentioned at the outset. First, there are different degrees of conformity to the law. It is difficult to envisage a legal system composed solely of precise, mechanical principles—and it would likely be undesirable even if possible. Some degree of discretion will always remain in the legal system.

Second, as AI is increasingly used to support or replace human decision-making, the question arises as to what kind of process should be afforded to individuals affected by such judgments. The growing prevalence of black-box machine-learning algorithms renders many machine decision-making virtually unintelligible. This opacity is compounded by the phenomenon of "automation bias," whereby individuals exhibit overconfidence in the judgments made by machines and display prejudice against challenges to those determinations. Although AI is often promoted for its potential to reduce costs and increase efficiency, these benefits remain uncertain in the face of obstacles, particularly if they include significant procedural rights, such as transparency and due process, that are poorly safeguarded.

Although there have been attempts to manage and regulate the development of AI, there are still some legal constraints that need to be taken into consideration. These restrictions include, among others:

1) **Inability to keep pace with technological change**: AI technology evolves rapidly, whereas lawmaking is inherently slow. New laws take time to draft and put into effect, and existing laws can swiftly become obsolete.

2) **Lack of global cooperation:** The growth and implementation of AI transcend national boundaries. In the absence of international coordination, fragmented legal frameworks risk creating inconsistencies, enforcement gaps, and jurisdictional challenges. These difficulties are exacerbated when infringing parties are positioned in another country or when the legal system is precarious.

3) **Ethical issues:** The possibility of bias, discrimination, and privacy invasion are a few of the serious ethical issues raised by AI.[82] These challenging ethical issues demand constant attention and assessment, and legal systems and regulations may find it difficult to handle them.

4) **Limited knowledge of AI**: Many legal professionals lack the technical know-how necessary to comprehend AI and its implications.[83] Their capacity to create and put into practice efficient legal regulations and policies may be constrained as a result.

82 Sharona Hoffman and Andy Podgurski, 'Artificial Intelligence and Discrimination in Health Care' (2019) 19(3) Yale Journal of Health Policy, Law, and Ethics 1.

83 Waleed Ali and Mohamed Hassoun, 'Artificial Intelligence and Automated Journalism: Contemporary Challenges and New Opportunities' (2019) 5(1) International Journal of Media, Journalism and Mass Communications 40. doi:10.20431/2454-9479.0501004.

6 INTERNATIONAL LEGAL DIFFICULTIES ARISING FROM THE USE OF AI

AI adoption generates a range of cross-border legal challenges that require careful attention.[84] In the United States, regulatory efforts regarding system-wide risk reduction in algorithmic decision-making have largely overlooked individual due process. There has been some agreement among recent legislative proposals from the United States; however, they have emphasised the need for systemic solutions rather than individual rights to contest, such as algorithmic impact studies or audits.

In contrast, regulators in Europe are approaching algorithmic decision-making from a comprehensive standpoint. The European Union's General Data Protection Regulation (GDPR),[85] which came into force in May 2018, provides certain individual rights for data subjects as well as systemic governance measures. Individuals whose decisions are subject to automated decision-making also have the ability to argue against specific findings. These rights also include access, transparency, amongst others. Similarly, the Council of Europe's updated data protection treaty specifies the right to appeal. The Council of Europe is an international organisation devoted to human rights, consisting of the member states of the European Union and a few non-EU nations.

Beyond Europe, the right to challenge AI outcomes is also gaining ground. The Organisation for Economic Co-operation and Development (OECD), an intergovernmental body influential in shaping global data protection regulations through its recommendations, is expected to extend its influence into AI governance as well. The "right to request a review of decisions taken" by AI is included in Brazil's extensive data protection law, enacted in 2018. Similarly, in November 2020, the Canadian Office of the Privacy Commissioner recommended amending Canada's data privacy law to introduce a right to challenge AI conclusions.

Despite these developments, several significant legal challenges arise from the use of AI:

1) **Intellectual property**: AI systems may be protected under trade secrets, copyrights, or other types of intellectual property protection.[86] When using another person's intellectual property, developers must take care to respect their rights and secure the appropriate licenses or permissions.

84 Erik Brynjolfsson and Andrew McAfee, 'Artificial Intelligence, for Real' (2017) 1 Harvard Business Review 1.

85 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) [2016] OJ L 119/1<http://data.europa.eu/eli/reg/2016/679/oj> accessed 20 April 2025.

86 Jennifer Cobbe and Jatinder Singh, 'Artificial Intelligence as a Service: Legal Responsibilities, Liabilities, and Policy Challenges' (2021) 42 Computer Law & Security Review 105573. doi:10.2139/ssrn.3824736.

2) **Liability**: AI raises complex questions of liability, especially in cases of accidents or errors brought on by algorithmic flaws, biases, or mismanagement. Developers and users must determine who should be held liable for any damage the systems may cause and ensure that sufficient insurance is in place to cover any potential risks. Traditional legal frameworks often struggle to sufficiently handle these unexpected difficulties, prompting calls for judicial precedents and clearer accountability standards.

3) **Jurisdiction**: As AI systems frequently operate across borders, they can lead to complicated jurisdictional difficulties. Developers and users must make sure they abide by the rules and laws of all pertinent jurisdictions.

4) **Prejudice**: AI systems trained on biased datasets risk generating discriminatory outcomes.

5) **Trade restrictions**: Where AI technologies have potential military or national security uses,[87] they may be subject to export controls and trade restrictions. Developers and users must therefore comply with all applicable export regulations.

7 CONCLUSIONS AND SUGGESTIONS

The role of statutory law in regulating AI is fundamental in striking a delicate balance between fostering innovation and ensuring responsibility. As AI continues to evolve at a rapid pace, the establishment of robust legal frameworks becomes essential to address the ethical, social, and economic implications that accompany its development. Moreover, effective regulation must be dynamic and adaptive, reflecting the evolving nature of technology while maintaining core principles of transparency, privacy, and security.

Notice and transparency obligations under the General Data Protection Regulation (GDPR) for AI have garnered more attention, especially the so-called "right to explanation," which has ignited an upsurge of scholarly discourse. Though the GDPR explicitly establishes the right to dispute, regulators have not yet offered substantial guidance on the nature of the right or how it should be exercised.

The essence of democracy is under threat from the growing use of AI in decision-making. It is crucial to use design approaches that incorporate judicial review concepts as a fundamental component of AI-driven architecture in order to restore human confidence in AI. However, AI cannot wholly replace human bias and is therefore not always accurate; instead, it may obscure bias behind layers of purportedly impartial mathematical authority. Algorithmic outcomes can be biased even when programmers do not intend to discriminate, and these problems manifest across diverse technologies. For example,

87 Frank A DeCosta III, 'Intellectual Property Protection for Artificial Intelligence' [2017] Westlaw Journal Intellectual Property <https://www.finnegan.com/en/insights/articles/intellectual-property-protection-for-artificial-intelligence.html> accessed 20 April 2025.

actuarial algorithms used in criminal sentencing— despite their simplicity—have been shown to perpetuate bias, discrimination, and inaccuracy.

AI decision-making further raises questions about "what it means to be human." By excluding human judgment, empathy, and contextual reasoning, both public and private institutions risk reducing individuals to numerical values. It is arguable that the dignity of the human subject of the judgment is compromised when human decision-makers are replaced by machines. Yet, it would be a mistake to assume that algorithms are inherently more flawed than human decision makers; judges, too, may act with prejudice or inaccuracy. The dignity of a human subject can also be harmed by discrimination by a human decision-maker.

However, the transition from human to AI or hybrid human-AI decision-making systems fundamentally changes the policy environment and its underlying values. For instance, AI decision-making transfers some policy decisions early on to algorithm designers, rather than allowing a human decision-maker to assess a specific individual's unique circumstances ex post. In many cases, policy choices remain embedded in the "black box" of the algorithm, potentially opaque even to its creators. Decision-making processes and who decides what vary. The lack of transparency undermines accountability and the outcomes of the decisions.

The transition from individual customisation to decisions based on categories may also accompany a shift in AI decision-making. This gives rise to an issue known as the "long-tail problem," when an AI incorrectly classifies "weird stuff that is hard to deal with" into familiar categories. For instance, a self-driving car that has been taught to stay away from deer, cats, and dogs might not be able to "see" kangaroos crossing the road. A fraud warning algorithm used by the United States Department of Agriculture for the Supplemental Nutrition Assistance Program was trained to detect fraudulent activity on whole-number purchases; however, it failed to detect fraudulent activity at Somali-American grocers, where clients would buy meat in whole dollars. In actuality, the "long tail" can contain items that are not objectively considered "weird": Inappropriate consideration of illnesses like cerebral palsy or diabetes, which are hardly anomalies, was made by the erroneous home health care allocation algorithms.

A multidimensional and cooperative effort among several stakeholders—including developers, regulators, legislators, and civil society organisations— is necessary for a comprehensive strategy to govern AI that accounts for its ethical, social, and economic consequences. Such a strategy should include the following components:

- **Fairness, accountability, transparency, and responsibility** should be given top priority when developing and deploying AI systems. Their design and implementation should respect human rights, embrace diversity, and promote the welfare of society, as recommended by programmers and regulators.

- **Public engagement** is essential to ensure that the needs and issues of all stakeholders are addressed. This may involve consultation with community organisations, civil society organisations, and those who may be impacted by the use of AI systems.
- **Data governance** should be regulated by specific regulations on collection and use, supported by authorisation frameworks that safeguard privacy. Data protection and privacy regulations must be followed by those who build and deploy AI systems.
- **Human oversight** is critical to guarantee that they are operated safely and responsibly. This may entail deploying "human-in-the-loop" technologies, which permit people and AI systems to collaborate on decision-making.
- **Risk assessment and management** should be integral when developing and deploying AI systems. Developers and regulators must assess the ethical, societal, and economic implications of AI systems and implement mitigation plans accordingly.
- **Interdisciplinary collaboration** among experts from a range of fields, including computer science, law, ethics, social sciences, and the humanities, ensures that broader societal impacts of the employment of AI systems are considered.
- **International coordination and cooperation** are necessary to address the global nature of AI. In order to advance ethical and responsible AI, governments and civil society organisations should work together to establish international standards and recommendations that promote ethical and responsible AI.
- Regulatory reform is required, such as amending existing AI regulations (e.g., EU AI Act) to mandate AIAs for all high-risk public-sector AI and private systems in healthcare, hiring, finance, and criminal justice.

By embracing this balanced approach, statutory law can play a crucial role in guiding AI towards a future where technological advancement and societal well-being are not mutually exclusive, but are instead harmoniously integrated. In doing so, we can harness the full potential of AI to drive progress and innovation while upholding our collective responsibility to ethical standards and human values. Ultimately, AI systems should be developed and implemented in ways that benefit all members of society and promote responsible, transparent, and ethical algorithms in line with principles of fairness, public participation, data governance, risk assessment, and international collaboration.

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АНОТАЦІЯ УКРАЇНСЬКОЮ МОВОЮ

Дослідницька стаття

РОЛЬ ЗАКОНОДАВСТВА В РЕГУЛЮВАННІ ШТУЧНОГО ІНТЕЛЕКТУ: БАЛАНС МІЖ ІННОВАЦІЯМИ ТА ВІДПОВІДАЛЬНІСТЮ

Абдесселам Салмі, Бхупал Бхаттахар'я, Сармістха Бхаттахар'я та Тарек Або Ель Вафа*

АНОТАЦІЯ

Вступ. *Штучний інтелект (ШІ) створює серйозні проблеми в управлінні, оскільки його швидка інтеграція в критичні сектори посилює ризики дискримінації, порушення конфіденційності та прогалин у підзвітності. Законодавство, яке традиційно лежить в основі національних правових систем, виявляється дедалі менш придатним для регулювання етичних, соціальних та економічних наслідків ШІ. Його структурна жорсткість у поєднанні з тривалими законодавчими процесами та фрагментацією юрисдикції робить його погано підготовленим до реагування на швидкозмінний характер алгоритмічних технологій. Як наслідок, виникають регуляторні прогалини у сферах застосування з високим рівнем ризику, таких як прогностична поліція, біометричне спостереження, медична діагностика та автономні озброєння, де помилки або упередження можуть призвести до незворотної шкоди. Багато чинних правових норм були створені без урахування складності та непрозорості систем машинного навчання, зокрема їх потенціал функціонувати всупереч традиційним уявленням про людський намір, відповідальність та передбачуваність. Як наслідок, існує нагальна потреба в науковому дослідженні концептуальних та практичних розбіжностей між інноваціями та регулюванням у контексті штучного інтелекту. Також це передбачає вивчення адаптивних правових меж, гібридних моделей управління та інтеграцію етичних принципів у технологічне проєктування.*

Методи. *У статті використовується порівняльно-правовий аналіз нормативно-правового регулювання у сфері штучного інтелекту в ключових юрисдикціях (ЄС, США, Китай, Бразилія, Велика Британія) у поєднанні з доктринальним дослідженням законодавчих текстів та судової практики. Методологія інтегрує систематичний огляд первинних джерел (наприклад, Закон ЄС про ШІ, проєкти Закону США про алгоритмічну підзвітність, тимчасові заходи GenAI Китаю), якісну оцінку вторинної літератури та*

інституційних звітів, використання принципу «Питання-Правило-Застосування-Висновок» для оцінки ефективності регулювання, а також міжюрисдикційне дослідження механізмів правозастосування та стандартів відповідальності.

Результати та висновки. *Аналіз виявляє критичні обмеження статутного права, юрисдикційні розбіжності в класифікації ризиків (наприклад, попередня оцінка відповідності в ЄС проти секторального постфактумного правозастосування в США), фрагментацію відповідальності та прогалини у правозастосуванні. Найголовніше, що самі по собі статутні підходи не можуть збалансувати просування інновацій з етичними обмеженнями: надмірне регулювання гальмує дослідження та розробки, а слабке – сприяє заподіянню шкоди суспільству. У дослідженні зроблено висновок, що ефективне управління вимагає додаткових етичних меж, які впроваджують прозорість, аудит упередженості та людський нагляд; міжнародну гармонізацію стандартів відповідальності та протоколів ризиків; адаптивні регуляторні умови для реальних випробувань; та співпрацю з багатьма зацікавленими сторонами для розробки контекстно-залежних впроваджень.*

Ключові слова: *ШІ, обмеження статутного права, технологічні інновації, розробка політики, правові межі.*

ABSTRACT IN ARABIC

مقال بحثي

دور التشريعات القانونية في تنظيم الذكاء الاصطناعي: الموازنة بين الابتكار والمسؤولية

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الملخص

الخلفية: يُشكّل الذكاء الاصطناعي تحديًا عميقًا لأنظمة الحوكمة، إذ إن تسارُع دمجه في القطاعات الحيوية يزيد من احتمالات التمييز، وانتهاك الخصوصية، واتساع فجوات المساءلة القانونية. وقد تبيّن أن القوانين التشريعية التقليدية، التي تشكّل الركيزة الأساسية للأنظمة القانونية الوطنية، أصبحت عاجزة على نحو متزايد عن مواكبة الآثار الأخلاقية والاجتماعية والاقتصادية المترتبة على تطور الذكاء الاصطناعي. فطبيعة هذه القوانين المتسمَة بالجمود البنيوي وبطء العملية التشريعية، إلى جانب تشتّت الأطر القانونية بين السلطات القضائية المختلفة، تجعلها غير قادرة على الاستجابة السريعة للتغير المتسارع في التقنيات الخوارزمية. وينتج عن ذلك فراغ تنظيمي واضح في مجالات عالية

الخطورة مثل التنبؤ الجرمي، والمراقبة البيومترية، والتشخيص الطبي، والأسلحة ذاتية التشغيل، وهي مجالات قد يؤدي فيها الخطأ أو الانحياز إلى أضرار لا يمكن تداركها. كما أن كثيرًا من القواعد القانونية الحالية وُضعت في زمن لم يتخيّل فيه المشرّع التعقيد والغموض الذي تتسم به أنظمة التعلّم الآلي، ولا قدرتها على العمل بطرق تتجاوز المفاهيم القانونية التقليدية حول النية البشرية، والمسؤولية، والتوقّع المسبق. لذلك، تبرز حاجة ملحّة إلى مزيد من البحث الأكاديمي المتعمّق لفهم التوتر القائم بين الابتكار والتنظيم القانوني في سياق الذكاء الاصطناعي، من خلال استكشاف أطر تشريعية أكثر مرونة، ونماذج حوكمة هجينة تجمع بين القانون والتقنية، مع دمج المبادئ الأخلاقية في تصميم الأنظمة الذكية منذ مراحلها الأولى.

المنهجية: اعتمدت هذه الدراسة على تحليل قانوني مقارن للأطر التشريعية المنظِّمة للذكاء الاصطناعي في عدد من الولايات القضائية الرئيسية تشمل الاتحاد الأوروبي، والولايات المتحدة، والصين، والبرازيل، والمملكة المتحدة، إلى جانب بحث فقهي تحليلي للنصوص التشريعية والأحكام القضائية ذات الصلة. تقوم المنهجية على مراجعة منهجية شاملة للمصادر الأولية مثل: قانون الذكاء الاصطناعي الأوروبي (EU AI Act)، ومسودات قانون المساءلة الخوارزمية الأمريكي (Algorithmic Accountability Act)، والتدابير المؤقتة الصينية لتنظيم الذكاء الاصطناعي التوليدي (GenAI Interim Measures)، إضافة إلى تقييم نوعي للمراجع الثانوية والتقارير المؤسسية التي تناولت قضايا الحوكمة والتنظيم. كما استخدم الباحثون إطار تحليل "القضية – القاعدة – التطبيق – النتيجة" (Issue–Rule–Application–Conclusion) لتقدير فعالية الأطر التنظيمية، مع مقارنة عابرة للأنظمة القانونية بغرض تحديد أوجه الاختلاف في آليات التنفيذ ومعايير المسؤولية القانونية بين الدول محل الدراسة.

النتائج والاستنتاجات: أظهرت نتائج التحليل أن القانون التشريعي يواجه قيودًا جوهرية في قدرته على مواكبة تحديات الذكاء الاصطناعي، وأن هناك تباينًا ملحوظًا بين الأنظمة القانونية المختلفة في تصنيف المخاطر وآليات التنظيم. فعلى سبيل المثال، يعتمد الاتحاد الأوروبي نهجًا استباقيًا (وقائيًا) يقوم على تقييم المطابقة المسبق للمخاطر، في حين تتبع الولايات المتحدة أسلوبًا لاحقًا (علاجيًا) يقوم على تطبيق القوانين القطاعية بعد وقوع الانتهاك. من المهم التأكيد على أن الاعتماد على الأطر التشريعية وحدها لا يحقق التوازن المطلوب بين تشجيع الابتكار وضبط الجوانب الأخلاقية؛ فالتنظيم المفرط يؤدي إلى خنق البحث والتطوير وإبطاء وتيرة التقدّم التقني، في حين أن التساهل في القواعد القانونية يفتح الباب أمام أضرار اجتماعية جسيمة تمس العدالة والمساءلة والثقة العامة في التكنولوجيا. خلصت الدراسة إلى أن الحوكمة الفعّالة للذكاء الاصطناعي تتطلب اعتماد أطر أخلاقية مكمّلة تُدمج فيها مبادئ الشفافية، ومراجعة الانحيازات، والإشراف البشري المستمر، إلى جانب العمل على توحيد المعايير الدولية الخاصة بالمسؤولية القانونية وبروتوكولات تقييم المخاطر. كما توصي الدراسة بإنشاء بيئات تنظيمية تجريبية مرنة (Regulatory Sandboxes) تسمح باختبار الأنظمة في ظروف واقعية قبل تطبيقها على نطاق واسع، مع تعزيز التعاون بين مختلف الأطراف المعنية — من حكومات ومطورين وباحثين ومؤسسات مجتمع مدني — لضمان تصميم حلول تنظيمية تراعي خصوصية السياقات القانونية والاجتماعية في كل دولة.