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Research Article

Global Evolution of Artificial Intelligence: Navigating Ethics, Policy, and Innovation for a Sustainable Future

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ABSTRACT

Artificial Intelligence (AI) is used as the term of simulation of human intelligence processes by machines, especially to computer systems. Learning, reasoning, problem solving, perception and language understanding are these processes. In a global sense, AI is a technological force on a par with guns, bombs, and all manner of weapons that brings together economics, operates in society, and transforms its governing structures. Current AI systems encompass autonomous vehicles, language models, predictive analytics, virtual assistants, and are redefining how nations operate and communicate. For the global development and deployment of AI, an approach that integrates technological and cultural diversity, values, regulatory frameworks and ethical issues is needed.

Keywords: autonomous, frameworks, diversity, regulatory

1. INTRODUCTION

The globalisation of the study of AI is of importance as the impact of this technology is vast and connected, also as nations of the world very differently sit on their proximity to technological capacity, data access, policy preparedness and the ethical governance of this field. Countries with more advanced AI capabilities than the US, China, and EU members are already setting global standards in areas like human impacts, where they are looking ahead. While low- and middle-income nations suffer from adoption of AI due to scarce infrastructure, data sovereignty issues, and algorithmic biases. To cover all the important aspects of it, one needs to have some understanding about AI from global perspective [towards responsible innovation and inclusion, inclusive development]. Moreover, it helps international cooperation in the field, increasing the chance to prevent the negative use of AI, and reducing the gap. The aim of this review is to discuss how artificial intelligence has evolved globally, emphasising in particular its evolution in relation to the interlinked themes of ethics, policy and practice. While this review is a secondary article, it synthesizes the existing research and policy developments to form an integrative analysis of how AI is being reshaped by—while it in turn reshapes—social norms, regulatory efforts and technology advancement in different parts of the world.

This report is comprised of various sections. The historical perspective of development of AI from a global perspective is provided as starting point. It then goes into a detailed exploration of ethical challenges with respect to AI, a broad overview of contemporary worldwide AI policies, and an overview of the innovation trends in countries and sectors. These themes are brought together in the discussion section, where they are critically evaluated together with respect to each other's interdependencies and

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implications that go beyond the context of this thesis. The report ends with insights and forward looking outlook of the dynamic global future of AI.

2. HISTORICAL EVOLUTION OF AI (GLOBAL OVERVIEW)

From Historical evolution of Artificial Intelligence (AI), this is a list of some historical marked milestones that had a huge impact in the worldwide technological journey. It was the mid 20th century when the idea of AI was invented, when Alan Turing, personified in his famous 1950s paper have the concept of a machine able to mimic human intelligence. The term artificial intelligence was coined formally in 1956 by meeting at the Dartmouth Conference of work known as the birthplace of AI as a research discipline (Kashefi et al., 2024). The first 18 years of AI was based on symbolic AI (on rules and logical representations) and represented by MYCIN in the 1980's, and showed how AI could promise a better approach to healthcare diagnosis.

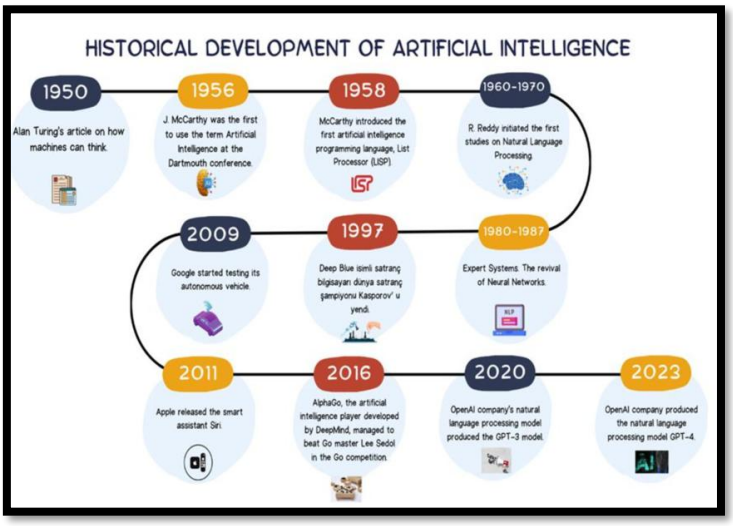

Figure 1: Historical Evolution of AI (Global Overview)

(Source: researchgate.net, 2025)

Mainly due to the work done by the institutions such as Stanford, MIT, and DARPA funded projects, the United States has previously led AI research with AI as we know it today. Along with increasing concerns regarding ethnic frameworks and AI for good, the European Union has also been playing an important role in ensuring the implementation of ethical frameworks of AI. Japan's Fifth Generation Computer Systems project in the 1980s was one of the earliest national strategies to invest in a narrow form of AI. Recently, China has become a global force, using state-backed initiatives, talent development and massive datasets, to heavily invest in AI (Lescrauwaet et al., 2022). There are other nations such as Canada, UK, South Korea, who have put in huge efforts into deep learning and reinforcement learning.

A major turning point in the late 1990s and early 2000s was to shift from symbolic AI to data driven machine learning. Catalyst for this was increased computational power, availability of big data, and development of algorithms able to learn from experience. Inspired by the structure of the human brain, deep learning, a subfield of machine learning, has revolutionized AI in the 2010s with deep learning's key breakthrough such as Google DeepMind's AlphaGo defeating human champs, and powered natural language processing models.

AI research and development have happened at breakneck speeds worldwide over the past few years. Countries vye to situate themselves as AI talent pipe wells, favourably develop the eco systems for startups, and take the lead in AI publications, and patents. Another contribution to the changing AI research landscape, has been created through international collaborations and open-source platform

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Research Article

(Polyportis & Pahos, 2024). We have entered a new era of globalization of AI where there is a complex dynamic interplay between innovation, ethics, and policy and where innovation in one place tends to trigger rapid responses and adaptations elsewhere. And it positions us to make sense and give shape to the ethical, political, and the inventive sides of AI in the world.

3. ETHICAL CONSIDERATIONS IN AI

As artificial intelligence (AI) systems become increasingly embedded in global decision-making processes, ethical considerations surrounding their development and deployment are moving to the forefront. Despite the remarkable capabilities AI offers, significant ethical challenges remain—particularly regarding bias, fairness, discrimination, surveillance, transparency, privacy, and accountability. Addressing these issues is essential if AI is to be deployed in ways that serve all of humanity equitably and responsibly.

One of the most pressing concerns is algorithmic bias, where AI systems produce unfair or discriminatory outcomes. According to,such bias can stem from unrepresentative training data, flawed model design, or the reinforcement of historical inequalities. A prominent example is facial recognition technology, which has been shown to misidentify individuals with darker skin tones—particularly women—at a much higher rate. In the context of law enforcement, this can have grave consequences, as biased predictive policing tools have disproportionately targeted marginalized communities, amplifying systemic discrimination and exacerbating social inequities (Zhao and Gómez Fariñas ,2023).

Beyond bias, privacy and surveillance are major ethical concerns in AI. Many AI systems rely on vast quantities of data, including sensitive personal information (Akinrinola et al., 2024). Without robust data governance frameworks and clear consent mechanisms, individuals may unknowingly be subject to invasive data practices. In certain countries, AI-powered surveillance tools such as facial recognition and gait analysis are used for population monitoring, raising alarms about civil liberties and the risk of government overreach. While some justify these technologies in the name of public safety, their use must be carefully regulated to avoid encroaching on privacy rights or enabling authoritarian control.

Another significant issue is transparency and accountability. Many AI systems, especially those built on deep learning models, function as “black boxes”—their decision-making processes are opaque even to their developers. This lack of explainability makes it difficult to assign responsibility when harm occurs. Consider the case of an autonomous vehicle involved in a crash or an AI model providing a faulty medical diagnosis. In such instances, determining liability becomes a complex challenge (Kulkov et al., 2024). To build trust, AI systems must be designed with transparency, explainability, and thorough documentation.

Real-world case studies further highlight the consequences of insufficient ethical oversight. IBM’s Watson for Oncology, for example, initially promised personalized cancer treatment recommendations but ultimately failed due to poorly validated training data. In cities such as London and Detroit, public protests have emerged in response to police use of facial recognition technologies, citing racial profiling and inadequate regulatory safeguards. These incidents underscore the need for ethical vigilance throughout the AI development lifecycle.

In response to these concerns, international organizations have introduced guidelines and frameworks aimed at promoting responsible AI. UNESCO’s *Recommendation on the Ethics of Artificial Intelligence* emphasizes the protection of human rights, inclusion, and sustainability. The *OECD AI Principles* call for systems that are transparent, accountable, and robust. The European Commission’s High-Level Expert Group on Artificial Intelligence has introduced the concept of “Trustworthy AI,” which encompasses lawful, ethical, and technically sound design (Walter, 2024).

A critical addition to this evolving framework is the introduction of ISO/IEC 42001, the first international management system standard specifically for artificial intelligence. Published by the International Organization for Standardization (ISO) and the International Electrotechnical

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Commission (IEC), ISO 42001 provides organizations with structured guidance to manage the risks and responsibilities of AI systems. It emphasizes ethical AI governance, transparency, accountability, and alignment with societal values, integrating these principles into operational practices. By embedding these requirements into AI lifecycle management, ISO 42001 supports the development of AI systems that are not only technically effective but also ethically sound and socially responsible.

While these frameworks mark significant progress, global implementation remains uneven, and many of these principles lack enforceability. Thus, ethical AI development requires interdisciplinary collaboration—combining technical innovation with ethical reasoning, regulatory foresight, and inclusive dialogue.

4. GLOBAL AI POLICY LANDSCAPE

Last year, artificial intelligence was woven into networks from which it will never be fully untangled: finance, health care, smart cities, transportation, weather prediction, warfare, and much more. With this, nations across the world have grown increasingly concerned — as will anyone with the capacity to think critically — that this field of study may also lend itself to serious abuse to the point that no creative possibility could be completely discounted, raising the appearance that it could become its own Orwellian dystopia. Nevertheless, the global AI policy landscape is characterized by different national strategies, conflicting priorities, and an intricate network of regulatory endeavours (Challoumis, 2024). Variations in regulatory approaches and standards of some regions can be traced to the fact that some regions strive for leadership by beacons of innovation and ethical governance while there are other regions focusing on strategic dominance and economic growth.

The European Union (EU) has come out as a global leader in ethical AI regulation with the EU AI Act, which was announced in 2021. A risk-based approach is outlined for the legislative framework for the classification of AI systems as unacceptable, high, limited and minimal risk. Strict transparency, accountability and human oversight requirements are needed for high-risk AI applications like, for example, in those applications used in critical infrastructure, biometric identification and hiring. The rule of democratic values and human centric innovation takes a regulatory tone and follows in the line of human first innovation led by the EU (Singh, 2023).

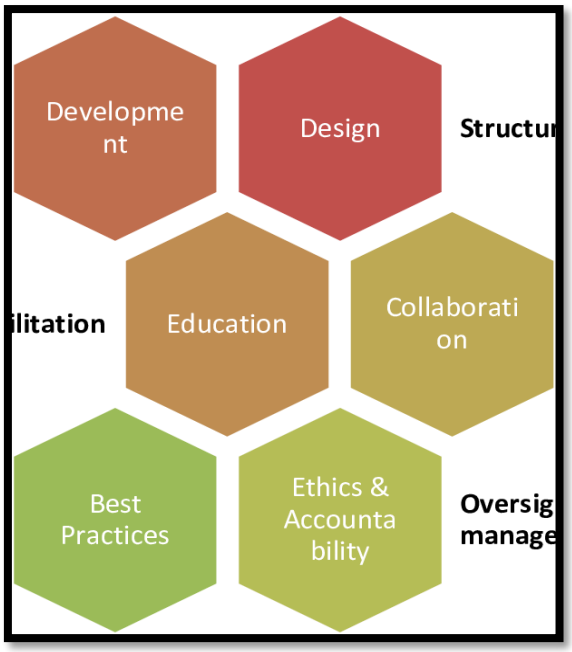

Figure 2: Global AI Policy Landscape

(Source: researchgate.net, 2025)

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Research Article

More decentralized, and more innovation friendly, the United States has adopted a different strategy. As opposed to a single national law, AI governance in the U.S. is fragmented at federal and state levels. The technical guidance is offered by agencies such as the National Institute of Standards and Technology (NIST) and the non-binding principles being set in place by the White House are around fairness, transparency, and accountability in AI. There exists a high priority in the U.S. to provide investment in fostering AI competitiveness, supporting public-private collaboration, and a paramount importance in maintaining U.S. leadership in AI research, especially as a result of DARPA and NSF funding. On the other hand, China's AI policy is very tightly linked to its overarching national vision of an economy and world influence (Stahl, 2021). In the New Generation Artificial Intelligence Development Plan (2017), China set the very ambitious goal of being the world leader in AI by 2030. Infrastructures and education of AI startups are also funded by the government. Meanwhile, AI is used by China for innovation as well as for surveillance, social scoring, and political control, which raises concern regarding civil liberties and oversight on ethics (Okatta et al., 2024). The algorithmic recommendation rules and the Generative AI Interim Measures are no more about human rights, rather about political stability and content moderation. But the different approaches indicate the regulatory divergence between the major powers. Strict governance and ethics is in favor by the EU, flexibility and innovation in the U.S., and centralized control and strategic dominance by China. Differences of this kind make it hard to derive an agreed global standard and undermine the case for a policy agreed globally.

Collaboration on AI policy internationally has been growing but is still rather meager. The OECD, UNESCO, and the Global Partnership on AI (GPAI) and other organizations promote the adoption of shared principles and knowledge exchange (Aderibigbe et al. 2023). Enforcement mechanisms, nevertheless, are weak, and geopolitics, in particular U.S.-China tensions, harm a multilateral goodwill. While many low- and middle-income countries have no representation in global forums at all they tend to exacerbate digital inequalities.

Innovative challenges related to standardization of AI across borders still exist. Some such issues as in data protection, algorithmic accountability and cybersecurity vary widely between jurisdictions. Inconsistent compliance requirements make navigating as multinational companies, while training even AI systems on one context may result in unpredictable outcomes in a different context (Daradkeh, 2023). In addition, AI's global supply chains and cloud infrastructures make national borders more and more blurred and thus present jurisdictional ambiguities.

Thus, stronger international coordination is required to foster responsible and inclusive AI governance (Omol, 2024). Key to managing the global impact of AI will be developing harmonized standards, promoting regulatory interoperability and achieving equitable participation of all regions. If such efforts are not made, the planet will further entrench digital divides while allowing the abuse of technology under incoherent regulatory oversight.

5. INNOVATION AND GLOBAL AI DEVELOPMENT TRENDS

Artificial intelligence is in the midst of a world sea change: relentless innovation, huge investment, lively sector collaboration, the global landscape is changing fast. It's no longer just leaving out of the realm of academic research or out of experimental labs; now foundational technology of industrial transformation, scientific discovery and society change. To understand global AI development trends, it is necessary to know which are the leading countries, what the technological breakthroughs are, what industry applications are there, and what the ecosystem of collaboration is that supports progress (Garikapati & Shetiya, 2024).

Many countries are leading the AI innovation frontier (Regona et al., 2024). However, today the United States continues to be a global leader with big technology companies such as Google, Microsoft, and OpenAI, who have created some of the most powerful AI systems up to date. While more regulation oriented, the European Union still invests heavily in research through Horizon Europe and ETH Zurich, to name an example. However, China has become a real threat, with cities like Beijing,

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Research Article

Shanghai and Shenzhen being AI innovation hubs backed up by massive public investment, rich data ecosystems and deepening talent pool. Institutions like Vector Institute and the Alan Turing Institute are also well known for their cutting edge research in machine learning and ethical AI, and for their prominence in the Canada and the United Kingdom.

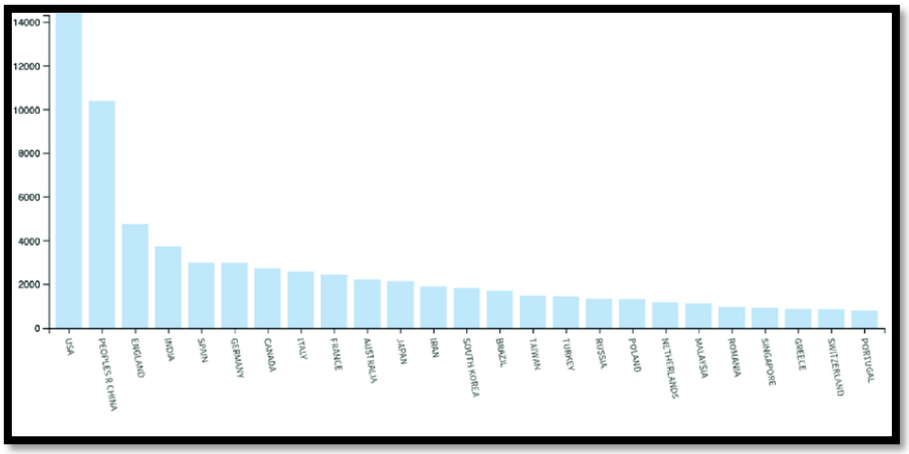

Figure 3: Innovation and Global AI Development Trends

(Source: researchgate.net, 2025)

Major breakthroughs continue to reshape the AI landscape. One of the most notable has been the rise of large-scale language models, such as OpenAI's GPT series, Google's PaLM, and Meta's LLaMA. These models exhibit remarkable abilities in generating human-like text, enabling new applications in writing, coding, translation, and customer service. In robotics, companies like Boston Dynamics and Tesla have advanced the integration of AI into autonomous machines with human-like mobility and decision-making (Challoumis, 2024). Meanwhile, AI-driven drug discovery platforms, such as DeepMind's AlphaFold, have revolutionized biological science by accurately predicting protein structures, accelerating medical research and reducing development timelines.

Across industries, AI is being deployed to enhance efficiency, decision-making, and customer experience. In healthcare, AI systems assist in diagnostics, personalized treatment planning, and pandemic modeling. In finance, AI powers fraud detection, algorithmic trading, and customer insights. In manufacturing, smart automation and predictive maintenance are streamlining operations (Adanma & Ogunbiyi, 2024). Retail, education, agriculture, and transportation are similarly leveraging AI for targeted marketing, crop optimization, learning analytics, and self-driving technologies. This broad applicability is driving a surge in global AI investment, with venture capital, corporate R&D, and government initiatives collectively fueling the rapid expansion of AI startups and enterprise adoption (Balyan et al., 2024).

Academia continues to play a central role in pushing the frontiers of AI. Leading universities around the world conduct foundational research in machine learning, computer vision, and natural language processing (Yanamala & Suryadevara, 2024). These institutions often act as incubators for talent and innovation, producing graduates who join or launch cutting-edge AI companies. Public-private partnerships are increasingly common, blending academic expertise with industry resources to accelerate research translation.

Democratizing AI innovation has also involved the open-source movement. With platforms like TensorFlow, PyTorch, and Hugging Face, the tool and pre trained model availability have been lowered significantly to provide developers all over the planet with them (Opesemowo & Adekomaya, 2024).

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6. DISCUSSION: INTEGRATION OF ETHICS, POLICY, AND INNOVATION

Working out the interplay of ethics, policy, and innovation will help us to develop a responsible and inclusive AI future. Innovation leads to the creation of new AI capabilities, policy creates the regulatory guardrails, while ethics remains the foundation in all of it. But achieving alignment across these elements is fraught with complex tension and hard.

The main problem is to avoid that innovation deviates from ethics. This is fast moving technology, there is regulatory lag, who knows how the systems will be deployed and not taken into account for what it will do to our society. Like overly rigid policies, too much rigidity in policies could slow down creativity and become a barrier to excellent innovation in relatively delicate sectors such as health and education. These trade-offs point to a need for governance models best suited to the process of innovation requiring flexibility and adaptability on the one hand and, on the other, preserving rather respect of the underlying ethical principles.

7. CONCLUSION AND FUTURE OUTLOOK

This implies that global AI evolution becomes a cyclical embrace among technological innovation, the ethical restraint, and policy governance. Major steps, ethical challenges, and regional strategies are illuminated for the complexity in development of AI. To leave no gaps in global dialogue and to ensure that ethical concerns are addressed and an inclusive innovation taken on board, it is crucial to continue. As AI technology keeps on advancing, it is vital to place extra emphasis on transparency and fairness, as well as accountability, when deploying AI technology to avoid mal treatment results. Continued work is needed to create inclusive and equitable benefits of AI for all through collaboration across international lines to enable responsible and equitable amounts of AI to society and humanity and perhaps a more sustainable future for all.

8. REFERENCES

Journals

[1] Adanma, U. M., & Ogunbiyi, E. O. (2024). Artificial intelligence in environmental conservation: evaluating cyber risks and opportunities for sustainable practices. *Computer Science & IT Research Journal*, *5*(5), 1178-1209. Retrieved from: https://www.researchgate.net/profile/Monica-Uwaga/publication/380775616_Artificial_intelligence_in_environmental_conservation_evaluating_cyber_risks_and_opportunities_for_sustainable_practices/links/67c37de5645ef274a4988e47/Artificial-intelligence-in-environmental-conservation-evaluating-cyber-risks-and-opportunities-for-sustainable-practices.pdf [Retrieved on 12th April 2025].

[2] Aderibigbe, A. O., Ohenhen, P. E., Nwaobia, N. K., Gidiagba, J. O., & Ani, E. C. (2023). Artificial intelligence in developing countries: Bridging the gap between potential and implementation. *Computer Science & IT Research Journal*, *4*(3), 185-199. Retrieved from: https://www.academia.edu/download/109270546/ARTIFICIAL_INTELLIGENCE_IN_DEVELOPING_COUNTRIES_BRIDGING_THE_GAP_BETWEEN_POTENTIAL_AND_IMPLEMENTATION.pdf [Retrieved on 12th April 2025].

[3] Akinrinola, O., Okoye, C. C., Ofodile, O. C., & Ugochukwu, C. E. (2024). Navigating and reviewing ethical dilemmas in AI development: Strategies for transparency, fairness, and accountability. *GSC Advanced Research and Reviews*, *18*(3), 050-058. Retrieved from: https://www.studocu.vn/vn/document/royal-melbourne-institute-of-technology-vietnam/digital-business-development/gscarr-2024-0088-asasasasasasasasas/90151076 [Retrieved on 12th April 2025].

[4] Balyan, S., Jangir, H., Tripathi, S. N., Tripathi, A., Jhang, T., & Pandey, P. (2024). Seeding a sustainable future: navigating the digital horizon of smart agriculture. *Sustainability*, *16*(2), 475. Retrieved from: https://www.mdpi.com/2071-1050/16/2/475 [Retrieved on 12th April 2025].

[5] Challoumis, C. (2024, October). Building a sustainable economy-how ai can optimize resource allocation. In *XVI International Scientific Conference* (pp. 190-224). Retrieved from:

https://conference-w.com/wp-content/uploads/2024/10/USA.P-0304102024.pdf#page=191 [Retrieved on 12th April 2025].

[6] Challoumis, C. (2024, October). Charting the course-The impact of AI on global economic cycles. In *XVI International Scientific Conference* (pp. 103-127). Retrieved from: https://conference-w.com/wp-content/uploads/2024/10/EST.T-1718102024.pdf#page=104 [Retrieved on 12th April 2025].

[7] Daradkeh, M. (2023). Navigating the complexity of entrepreneurial ethics: A systematic review and future research agenda. *Sustainability*, *15*(14), 11099. Retrieved from: https://www.mdpi.com/2071-1050/15/14/11099 [Retrieved on 12th April 2025].

[8] Garikapati, D., & Shetiya, S. S. (2024). Autonomous vehicles: Evolution of artificial intelligence and the current industry landscape. *Big Data and Cognitive Computing*, *8*(4), 42. Retrieved from: https://www.mdpi.com/2504-2289/8/4/42 [Retrieved on 12th April 2025].

[9] Kashefi, P., Kashefi, Y., & Ghafouri Mirsaraei, A. (2024). Shaping the future of AI: balancing innovation and ethics in global regulation. *Uniform Law Review*, *29*(3), 524-548. Retrieved from: https://academic.oup.com/ulr/article-abstract/29/3/524/7904690 [Retrieved on 12th April 2025].

[10] Kulkov, I., Kulkova, J., Rohrbeck, R., Menvielle, L., Kaartemo, V. and Makkonen, H., 2024. Artificial intelligence-driven sustainable development: Examining organizational, technical, and processing approaches to achieving global goals. *Sustainable Development*, *32*(3), pp.2253-2267. Retrieved from: https://onlinelibrary.wiley.com/doi/abs/10.1002/sd.2773 [Retrieved on 12th April 2025].

[11] Lescrauwaet, L., Wagner, H., Yoon, C., & Shukla, S. (2022). Adaptive legal frameworks and economic dynamics in emerging tech-nologies: Navigating the intersection for responsible innovation. *Law and Economics*, *16*(3), 202-220. Retrieved from: https://journals.ristek.or.id/index.php/LE/article/view/61 [Retrieved on 12th April 2025].

[12] Okatta, C. G., Ajayi, F. A., & Olawale, O. (2024). Navigating the future: integrating AI and machine learning in hr practices for a digital workforce. *Computer science & IT research journal*, *5*(4), 1008-1030. Retrieved from: https://www.researchgate.net/profile/Chinenye-Okatta/publication/380166321_NAVIGATING_THE_FUTURE_INTEGRATING_AI_AND_MACHINE_LEARNING_IN_HR_PRACTICES_FOR_A_DIGITAL_WORKFORCE/links/662eaf5906ea3d0b74166208/NAVIGATING-THE-FUTURE-INTEGRATING-AI-AND-MACHINE-LEARNING-IN-HR-PRACTICES-FOR-A-DIGITAL-WORKFORCE.pdf [Retrieved on 12th April 2025].

[13] Omol, E. J. (2024). Organizational digital transformation: from evolution to future trends. *Digital Transformation and Society*, *3*(3), 240-256. Retrieved from: https://www.emerald.com/insight/content/doi/10.1108/dts-08-2023-0061/full/html [Retrieved on 12th April 2025].

[14] Opesemowo, O. A. G., & Adekomaya, V. (2024). Harnessing artificial intelligence for advancing sustainable development goals in South Africa's higher education system: A qualitative study. *International Journal of Learning, Teaching and Educational Research*, *23*(3), 67-86. Retrieved from: http://ijlter.myres.net/index.php/ijlter/article/view/1885 [Retrieved on 12th April 2025].

[15] Polyportis, A. & Pahos, N., 2024. Navigating the perils of artificial intelligence: a focused review on ChatGPT and responsible research and innovation. *Humanities and Social Sciences Communications*, *11*(1), pp.1-10. Retrieved from: https://www.nature.com/articles/s41599-023-02464-6 [Retrieved on 12th April 2025].

[16] Regona, M., Yigitcanlar, T., Hon, C., & Teo, M. (2024). Artificial intelligence and sustainable development goals: Systematic literature review of the construction industry. *Sustainable Cities and Society*, 105499. Retrieved from: https://www.sciencedirect.com/science/article/pii/S2210670724003251 [Retrieved on 12th April 2025].

[17] Singh, B. (2023). Federated learning for envision future trajectory smart transport system for climate preservation and smart green planet: Insights into global governance and SDG-9 (Industry, Innovation and Infrastructure). *National Journal of Environmental Law*, *6*(2), 6-17. Retrieved from: https://www.researchgate.net/profile/Bhupinder-Singh-49/publication/374053367_Environmental_Law_Federated_Learning_for_Envision_Future_Trajectory_Smart_Transport_System_for_Climate_Preservation_and_Smart_Green_Planet_Insights_into_Global_Governance_and_SDG-9_Industry_Innovation/links/650b00a382f01628f034444e/Environmental-Law-Federated-Learning-for-Envision-Future-Trajectory-Smart-Transport-System-for-Climate-Preservation-and-Smart-Green-Planet-Insights-into-Global-Governance-and-SDG-9-Industry-Innovatio.pdf [Retrieved on 12th April 2025].

[18] Stahl, B. C. (2021). *Artificial intelligence for a better future: an ecosystem perspective on the ethics of AI and emerging digital technologies* (p. 124). Springer Nature. Retrieved from: https://www.researchgate.net/profile/Bhupinder-Singh-49/publication/374053367_Environmental_Law_Federated_Learning_for_Envision_Future_Trajectory_Smart_Transport_System_for_Climate_Preservation_and_Smart_Green_Planet_Insights_into_Global_Governance_and_SDG-9_Industry_Innovation/links/650b00a382f01628f034444e/Environmental-Law-Federated-Learning-for-Envision-Future-Trajectory-Smart-Transport-System-for-Climate-Preservation-and-Smart-Green-Planet-Insights-into-Global-Governance-and-SDG-9-Industry-Innovatio.pdf [Retrieved on 12th April 2025].

[19] Walter, Y., 2024. Managing the race to the moon: Global policy and governance in artificial intelligence regulation—A contemporary overview and an analysis of socioeconomic consequences. *Discover Artificial Intelligence*, *4*(1), p.14. Retrieved from: https://link.springer.com/article/10.1007/s44163-024-00109-4 [Retrieved on 12th April 2025].

[20] Yanamala, A. K. Y., & Suryadevara, S. (2024). Navigating data protection challenges in the era of artificial intelligence: A comprehensive review. *Revista de Inteligencia Artificial en Medicina*, *15*(1), 113-146. Retrieved from: https://www.academia.edu/download/119087510/113_146_redc_2024.pdf [Retrieved on 12th April 2025].

[21] Zhao, J., & Gómez Fariñas, B. (2023). Artificial intelligence and sustainable decisions. *European Business Organization Law Review*, *24*(1), 1-39. Retrieved from: https://link.springer.com/article/10.1007/s40804-022-00262-2 [Retrieved on 12th April 2025].

Websites

[1] researchgate.net, 2025. *Historical Evolution of AI (Global Overview)* (Online). Retrieved from: https://www.researchgate.net/figure/Historical-Development-of-Artificial-Intelligence-Source-Developed-by-the-Author-using_fig1_384292752 [Retrieved on 12th April 2025].

[2] researchgate.net, 2025. *Global AI Policy Landscape* (Online). Retrieved from: https://www.researchgate.net/figure/Recommendations-on-the-AI-policy-framework_fig1_349190906 [Retrieved on 12th April 2025].

[3] researchgate.net, 2025. *Innovation and Global AI Development Trends* (Online). Retrieved from: https://www.researchgate.net/figure/Bar-graph-of-research-data-records-on-AI-classified-by-country_fig2_360123241 [Retrieved on 12th April 2025].