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Sumário

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Inteligência Artificial Generativa como Tecnologia Emergente: uma análise jurídica e ética na Malásia e no Uzbequistão

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Abstract

Generative artificial intelligence (AI) has gained considerable interest due to its exceptional capacity to produce text, graphics, and several other types of material. This emerging technology is swiftly revolutionizing the worldwide terrain. Generative AI algorithms can augment creative expression and create novel creative opportunities. Although generative AI promises economic expansion and creativity, it poses intricate legal and ethical dilemmas. This article examines the legal and moral consequences of adopting generative AI technology, specifically focusing on the legal stances of Malaysia and Uzbekistan. This article employs a qualitative research methodology, specifically utilising a doctrinal and comparative legal approach and conducting a content analysis of the primary source, which consists of the laws and regulations in both countries. The authors contend that while generative AI can offer valuable insights into technology, it has also sparked numerous legal and ethical concerns and given rise to criminal liability. The absence of regulation in this field underscores the necessity of implementing rules to mitigate the negative consequences associated with the use of generative AI. Furthermore, the authors argue that generative AI technology carries inherent risks such as copyright, criminal liability, and the erosion of personal data and privacy, which are fundamental human rights principles, leading to public scepticism towards the government. The paper emphasises the need for legal control in this field. The study examines the existing regulatory structures in both countries, highlighting the difficulties and opportunities presented by the growing use of generative AI. This article offers valuable insights for policymakers, industry stakeholders, and researchers working in these dynamic environments by examining crucial legal and ethical factors.

Keywords: generative AI; Malaysia; Uzbekistan; privacy and data protection; ethical issues; European Union.

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Resumo

A inteligência artificial generativa (IA) tem despertado considerável interesse devido à sua capacidade excepcional de produzir textos, gráficos e diversos outros tipos de conteúdo. Essa tecnologia emergente está rapidamente transformando o cenário global. Os algoritmos de IA generativa podem ampliar a expressão criativa e gerar novas oportunidades de criação. Embora a IA generativa prometa expansão econômica e criatividade, ela também suscita dilemas jurídicos e éticos complexos. Este artigo examina as consequências jurídicas e morais da adoção da tecnologia de IA generativa, com foco específico nas posturas legais da Malásia e do Uzbequistão. O estudo adota uma metodologia de pesquisa qualitativa, valendo-se especificamente de uma abordagem jurídica doutrinária e comparativa, e realizando uma análise de conteúdo da fonte primária, constituída pelas leis e regulamentos de ambos os países. Os autores sustentam que, embora a IA generativa possa oferecer contribuições valiosas para a compreensão tecnológica, ela também tem suscitado inúmeras questões jurídicas e éticas e dado origem a responsabilidades penais. A ausência de regulamentação nesse campo evidencia a necessidade de implementação de normas para mitigar as consequências negativas associadas ao uso da IA generativa. Além disso, os autores argumentam que a tecnologia de IA generativa acarreta riscos inerentes, tais como questões de direitos autorais, responsabilidade penal e a erosão de dados pessoais e da privacidade — princípios fundamentais dos direitos humanos —, conduzindo a uma crescente desconfiança pública em relação ao governo. O artigo enfatiza a necessidade de controle jurídico nessa área. O estudo analisa as estruturas regulatórias vigentes em ambos os países, destacando as dificuldades e oportunidades apresentadas pelo uso crescente da IA generativa. Ao examinar fatores jurídicos e éticos cruciais, este trabalho oferece subsídios relevantes para formuladores de políticas públicas, atores do setor e pesquisadores que atuam nesses contextos dinâmicos.

Palavras-chave: inteligência artificial generativa; Malásia; Uzbequistão; privacidade e proteção de dados; questões éticas; União Europeia.

1 Introduction

Artificial Intelligence (AI) has transitioned from a specialized academic field into a transformative force, shaping industries and everyday practices. Among its many branches, Generative AI stands out for its ability to create content that mimics human creativity. This technology powers systems capable of generating text, images, music, and even complex scientific data, fundamentally altering how content is created and consumed. At the heart of this evolution are sophisticated machine learning models and algorithms, such as Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), and Transformer-based models like GPT-4. These models enable AI to produce realistic and creative outputs, finding applications across sectors like entertainment, healthcare, finance, and education.[1]

However, the widespread adoption of Generative AI also raises critical legal, ethical, and societal challenges. As AI-generated content becomes increasingly indistinguishable from human-made works, issues related to data privacy, intellectual property, misinformation, and ethical use demand urgent attention. This paper seeks to examine these issues by analyzing the current legal frameworks and ethical guidelines that govern the use of Generative AI, focusing on the examples of Malaysia and Uzbekistan. These countries were selected due to their contrasting yet complementary economies, which provide a valuable comparative perspective on how emerging economies can navigate AI adoption responsibly.[2]

This paper begins by explaining the development of generative AI and justifying the selection of Malaysia and Uzbekistan for this study. The second section outlines the evolution of AI-related laws in Malaysia, followed by an examination of Uzbekistan's legal stance on similar AI governance. The fourth section delves into the challenges associated with generative AI's use and development, concluding with recommendations

[1] BENGESI, S.; EL-SAYED, H.; SARKER, M. K; HOUKPATI, Y.; IRUNGU, J.; OLADUNNI, T. Advancements in Generative AI: A Comprehensive Review of GANs, GPT, Autoencoders, Diffusion Model, and Transformers. *ArXiv*, 17 Nov. 2023. Available at: https://doi.org/10.48550/arxiv.2311.10242. Access on: 6 fev. 2025.

[2] BENGESI, S.; EL-SAYED, H.; SARKER, M. K; HOUKPATI, Y.; IRUNGU, J.; OLADUNNI, T. Advancements in Generative AI: A Comprehensive Review of GANs, GPT, Autoencoders, Diffusion Model, and Transformers. *ArXiv*, 17 Nov. 2023. Available at: https://doi.org/10.48550/arxiv.2311.10242. Access on: 6 fev. 2025.

for governments to adopt policies to mitigate the risks posed by generative AI technologies.

2 Development of Generative AI

Generative AI's roots trace back to the 1960s with the development of early chatbots. However, it wasn't until 2014, with the introduction of Generative Adversarial Networks (GANs), that AI gained the ability to produce realistic images, videos, and audio that closely resemble human works. Over the years, advances in GANs and other machine learning algorithms have revolutionized generative AI, facilitating breakthroughs across industries such as healthcare, education, hospitality, and energy distribution. In the medical field, AI models like ChatGPT have shown potential to enhance diagnostic capabilities, research methodologies, and patient care strategies.[3]

Generative AI's applications are expanding rapidly. In hospitality and tourism, AI is transforming service delivery and creating opportunities for personalized experiences. In education, AI technologies are reshaping content generation and research, offering new ways to enhance learning and teaching. Despite these opportunities, the integration of generative AI into various sectors raises pressing concerns about privacy, security, and transparency. Academic integrity, especially regarding authorship and plagiarism, has become a key issue as generative AI plays a more prominent role in content creation.[4] Moreover, the use of AI technologies necessitates ethical considerations, such as ensuring that AI-generated outputs are free from bias and uphold privacy standards. As AI systems generate content based on vast amounts of data, maintaining transparency in the process is essential to prevent the misuse of AI and safeguard against discriminatory outcomes.[5]

3 Justification for Countries Selection

The choice of Malaysia and Uzbekistan for this study stems from their emerging economies and contrasting socio-legal landscapes. Malaysia's robust digital infrastructure and established regulatory frameworks make it an ideal case for understanding how generative AI can be integrated into existing legal systems. Uzbekistan, with its post-Soviet market economy, provides a unique perspective on the challenges faced by countries still developing their AI governance frameworks. The comparison between these two countries offers valuable insights into how different cultural and economic contexts shape the adoption and regulation of generative AI. Furthermore, Malaysia's well-established AI policies and ethical guidelines provide a rich data source for research, while Uzbekistan offers an interesting case study in navigating the complexities of AI regulation in a rapidly evolving technological environment. The insights drawn from this comparison can guide other emerging nations as they seek to balance innovation with the need for ethical and legal safeguards.

4 Legal Position of Generative AI in Malaysia

Malaysia's AI ecosystem is fast changing as the government and business communities drive digital transformation. The National AI Framework, launched by the Malaysian government, integrated AI into the economy to improve public services and boost productivity. The Artificial Intelligence (AI) market is expected to grow until 2030 due to industry adoption of AI technologies, advances in AI algorithms and infrastructure, and increased investment in AI research and development.[6]

AI has revolutionised the daily lives of Malaysians by offering personalised experiences, efficiency, and simplicity of use in various domains. According to the Malaysian Multimedia Commission (2021), Siri and Google Assistant are utilised by more than 70% of Malaysian smartphone consumers daily. Furthermore, QR codes and other AI-driven solutions have expe-

[3] MEGAHED, F. M.; CHEN, Y. J.; FERRIS, J. A.; KNOTH, S.; JONES-FARMER, L. A. How generative AI models such as ChatGPT can be (mis) used in SPC practice, education, and research? An exploratory study. *Quality Engineering*, v. 36, n. 2, p. 287-315, 2024.

[4] WIRZAL, M. D. H.; NORDIN, N. A. H. M.; ABD, N. S.; HALIM, M. Generative AI in Science Education: A Learning Revolution or a Threat to Academic Integrity? A Bibliometric Analysis. *Journal of Educational Research and Studies: e-Saintika*, v. 8, n. 3, p. 319-351, 2024.

[5] GROOT, J. de; PALUCHOWSKA-MESSING, A.; MACIULEWICZ, J.; JARECKA, A. Keynote lectures. *Multiple Sclerosis Journal*, v. 18, S5-S10, 2012.

[6] MANAP, N. A.; ABDULLAH, A. Regulating artificial intelligence in Malaysia: The two-tier approach. *UUM Journal of Legal Studies*, v. 11, n. 2, p. 183-201, 2020.

rienced substantial growth in the business sector. Bank Negara Malaysia reported that QR code transactions increased by more than 300% in 2020, suggesting that Malaysians prefer contactless payments. According to MIER research 2023, online sales have increased due to personalized product recommendations based on AI algorithms.[7]

The development and regulation of Generative AI in Malaysia present a complex landscape that intertwines technological advancements with legal and ethical considerations. As Malaysia embraces the opportunities and challenges posed by AI deployment, navigating the evolving legal frameworks becomes crucial to ensure responsible innovation and societal well-being. The ethical dimensions of AI in healthcare underscore the importance of leveraging AI to enhance care systems while mitigating potential harms. This dual advantage emphasises the need for policymakers and developers to prioritise ethical considerations when integrating AI technologies. 7

In the realm of election campaigns, the utilisation of AI, particularly Generative AI, has demonstrated cost--cutting benefits by aiding in drafting communication materials such as fundraising emails. It highlights the practical applications of AI in streamlining processes within specific sectors, shedding light on the potential efficiency gains that can be achieved through AI integration. Moreover, the impact of AI on social science in Malaysia emphasises the necessity of interdisciplinary collaborations and capacity-building efforts to ensure the ethical deployment of AI technologies. By prioritising these aspects, Malaysia can shape a future that aligns with the principles of social justice and collective well-being.7

Accountability in AI systems is a critical aspect that intersects with legal considerations, emphasising the need for explanations in AI decision-making processes.[8] This accountability underscores the importance of transparency and oversight in AI deployment to ensure adherence to legal standards and ethical principles. Furthermore, strategies for workforce readiness and inclusive growth in the AI landscape in Malaysia are essential for positioning the country as a leader in the global economy. By prioritising social equity and sustainable development, Malaysia can harness the potential of AI to create a resilient and prosperous society. Such efforts are also in tandem with the 2020 report by the World Bank on Malaysia, which highlights the capacity of artificial intelligence (AI) to strengthen economic resilience and prosperity through its ability to stimulate innovation, boost productivity, and foster inclusive growth.[9]

The principles of explainable artificial intelligence offer a multidisciplinary framework encompassing the diverse aspects of AI development, including legal and ethical dimensions.[10] These principles provide a roadmap for ensuring transparency and interpretability in AI systems, aligning with legal requirements and ethical standards. Understanding the mechanisms, impacts, and policy interventions for inclusive employment in the AI era is crucial for navigating the evolving landscape of AI technologies in Malaysia.[11] By comprehensively addressing these aspects, Malaysia can foster an inclusive environment that harnesses the benefits of AI while mitigating potential challenges. Navigating the legal and ethical conundrums of using AI-generated content in arbitration underscores the importance of upholding legal standards and ethical considerations in AI applications.[12]

The role of AI in improving access to justice highlights the potential of specialised AI systems to reduce barriers to the legal system.[13] It underscores the transformative impact of AI in enhancing legal services and

[7] TAJUDEEN, F. P.; MOGHAVVEMI, S.; THIRUMOORTHI, T.; PHOONG, S. W.; BAHRI, E. N. B. A. *Digital Transformation of Malaysian Small and Medium Enterprises*. [*S.l.*]: Emerald Group Publishing, 2025.

[8] MENIS-MASTROMICHALAKIS, O. R. F. E. A. S. *Explainable Artificial Intelligence*: An STS perspective. [*S. l.: s. n.*], 2024.

[9] COLLINA, L.; SAYYADI, M.; PROVITERA, M. *Critical issues about AI accountability answered.* 2023. Available at: https://cmr.berkeley.edu/assets/documents/pdf/2023-11-critical-issues-about-a-i-accountability-answered.pdf. Access on: 6 fev. 2025.

[10] OLORUNFEMI, O. L.; AMOO, O. O.; ATADOGA, A.; FAYAYOLA, O. A.; ABRAHAMS, T. O.; SHOETAN, P. O. *Towards a conceptual framework for ethical AI development in IT systems*. [*S. l.: s. n.*], 2024.

[11] EKONG, H. Navigating the AI Era: Understanding Mechanisms, Impacts, and Policy Interventions for Inclusive Employment in Malaysia. *Impacts, and Policy Interventions for Inclusive Employment in Malaysia,* Apr. 2024.

[12] LABANIEH, M. F., HUSSAIN, M. A., AYUB, Z. A., & Al-AZZAWI, H. A. (2024, January). Navigating Legal And Ethical Conundrums of Using AI-Generated Content (AI-GC) Systems In Arbitration. *In:* UUM INTERNATIONAL LEGAL CONFERENCE (UUMILC 2023), 12., 2023. *Proceedings* [...], Zhengdong: Atlantis Press, 2023. v. 15, p. 271.

[13] VARGAS-MURILLO, A. R.; TURRIATE-GUZMAN, A. M.; DELGADO-CHÁVEZ, C. A.; SANCHEZ-PAUCAR, F. Transforming justice: Implications of artificial intelligence in legal systems. *Academic Journal of Interdisciplinary Studies*, v. 13, n. 2, p. 433, 2024.

promoting inclusivity within the legal framework. AI is crucial in improving access to justice by automating repetitive tasks, enhancing legal research efficiency, and assisting in document analysis and case management. Through natural language processing and machine learning algorithms, AI systems can help identify relevant legal precedents, streamline document review processes, and provide legal guidance to individuals who may not have access to traditional legal services. Additionally, AI-powered tools can support legal aid organizations by enabling faster and more cost-effective delivery of legal assistance to underserved communities, thereby promoting fairness and equality in the justice system.

The Malaysian government is also implementing aggressive measures to regulate the advancement and use of artificial intelligence (AI), specifically generative AI (GAI), due to its capacity to generate novel content. The National Artificial Intelligence Roadmap 2021-2025 has been launched by the Ministry of Science, Technology, and Innovation (MOSTI) to lead this endeavour. In addition, Minister Chang Lih Kang has unveiled proposals for comprehensive Artificial Intelligence (AI) legislation. This legislation seeks to tackle AI-related concerns like data privacy, public knowledge, openness, and cyber defence. The AI Bill aims to achieve a harmonious equilibrium between minimising potential hazards and promoting creativity. The objective is to guarantee that AI functions as a beneficial influence on Malaysia's economic and social advancement.

Presently, the ownership of AI-generated technologies and creative works becomes ambiguous due to the existing legislations on Patents and Copyright Acts on intellectual property, which are insufficient to govern the inventions and any works generated by AI technology. Although humans are presently recognised as inventors, the new proposed bill could tackle the ownership issue through artificial intelligence.

5 AI Law and Copyright in Malaysia

In relation to copyright law, Section 7(3)(a) of Malaysia's Copyright Act 1987 requires literary, musical, and creative works to be original after due effort. The Federal Court recently ruled that copyright in works requires sufficient time, labour, and skill to render the same original. **YKL Engineering Sdn Bhd v. Sungei Kahang Palm Oil Sdn Bhd & Anor [2022] 8 CLJ 32.** Thus, it can be inferred that an AI-produced work is original if the AI creates it with enough effort. But what constitutes sufficient effort remains subjective.

The Patents Act 1983 and the Patents Regulations 1986 did not define the words «inventor.» Nevertheless, several court judgments by the Malaysian Court suggest that AI may not be an «inventor.» The judges opined that an «invention» is an inventor's idea that solves a technology challenge, according to Section 12 of the Patents Act 1983. It may be argued that only humans can have ideas. Regulation 6 of the Patents Regulations 1986 requires inventors to be named and addressed. The phrasing suggests that the Patents Act 1983 and its related statutes view the inventor as a human person who can conceptualise ideas, have a name, address, or sign a declaration.[14] The above concept of inventors under the Patents Act creates the same dilemma for the author or ownership of copyrighted materials under Section 7 of the Copyright Act 1987.

Conversely, the Personal Data Protection Act 2010 applies to artificial intelligence systems that gather and handle personal data. It guarantees adherence to data protection rules such as consent and data security. The first data protection law in Malaysia was passed by the Malaysian Parliament on June 2, 2010, and entered into force on November 15, 2013, called the Personal Data Protection Act 2010 (PDPA).[15] The advancement of technology has raised questions on whether the Personal Data Protection Act 2010 (PDPA) could adequately protect the personal data of Malaysians.[16]

The formulation of the Malaysia Personal Data Protection Act 2010 set a general guideline for all data practitioners. However, it is observed that Malaysia needs a tailormade framework that guides the collection and

[14] LEE, C. W.; FU, M. W. Conceptualizing Sustainable Business Models Aligning with Corporate Responsibility. *Sustainability*, v. 16, n. 12, p. 5015, 2024.

[15] KANOJIA, S.; ZAHRA, I. A. Economic Development and Privacy Regulations in Malaysia: The Case of PDPA 2010. *In:* AL-HUMAIRI, Safaa Najah Saud; HAJAMYDEEN, Asif Iqbal; MAHFOUDH, Asmaa. Sustainable Smart Cities and the Future of Urban Development. Pennsylvania: IGI Global Scientific Publishing, 2025. p. 443-462.

[16] KANOJIA, S.; ZAHRA, I. A. Economic Development and Privacy Regulations in Malaysia: The Case of PDPA 2010. *In:* AL-HUMAIRI, Safaa Najah Saud; HAJAMYDEEN, Asif Iqbal; MAHFOUDH, Asmaa. Sustainable Smart Cities and the Future of Urban Development. Pennsylvania: IGI Global Scientific Publishing, 2025. p. 443-462.

processing of digital information based on the country's perspectives.[17] The PDPA is concerned with issues such as personal data protection principles, types of personal data, management of personal data, mechanism of personal data protection and security, commission of personal data protection, transfers of personal data, resolution mechanism of personal data dispute and criminal sanctions and civil claims.[18] Shah & Khan contends that despite having PDPA laws in Malaysia, challenges exist with the fast-paced advancement in Data Analytics and Artificial Intelligence innovation and catering for such standards.[19]

In an increasingly interconnected world, legal systems around the globe are facing similar challenges and opportunities, particularly in emerging areas such as artificial intelligence (AI) regulation. As nations strive to navigate the complex technological innovation landscape while safeguarding fundamental rights and societal values, benchmarking against other jurisdictions has become imperative. The EU AI Act stands out for its comprehensive regulatory framework, addressing key aspects such as transparency, accountability, and ethical AI deployment.[20]

With reference to the European context, it can be observed that the European Parliament on March 13, 2024 approved the European Union's AI Act. Article 3(60) of the AI Act defines deepfake technology as synthetic or manipulated image, audio, or video content that essentially seems truthful or authentic, resembling existing individuals, places, objects, or other events or entities. Also, the AI deep fake technology was assessed based on their possible risk, and as the risk is higher, the rules will be more stringent for the product developers.[21]

The EU AI Act has tackled the uncertainty of AI-generated content in the context of its definition and transparency for AI providers and deployers. Many academics underline, especially the dearth of studies looking at their fit with the General Data Protection Regulation (EU) 2016/679 (GDPR) and the European Convention on Human Rights (ECHR). Building on the author's past work, Articles 8 and 10 of the ECHR and the GDPR propose two modifications to close a knowledge vacuum. Firstly, structured synthetic data for deepfake detection is required to fortify security and protect fundamental rights.[22] Secondly, it classifies artificial intelligence meant for deep fake election misinformation, extortion, and AI sexual abuse material as «high-risk,» given their substantial potential for damage and violation of rights.

The EU AI Act has set out horizontal rules for developing, commodifying, and using AI-driven products, services, and systems, including regulations on AI systems and data protection.[23] The Act introduces more robust legal requirements such as third-party conformity assessment, fundamental rights impact assessment, transparency obligations, and enhancements to existing EU data protection laws.[24] This legal framework is designed to promote trustworthy AI and is a significant step towards regulating artificial intelligence. The EU's goal with the proposed AI Act is to establish itself as a leader in AI regulation.[25]

[17] CHEN, L. F.; ISMAIL, R. Information Technology program students' awareness and perceptions towards personal data protection and privacy. *In*: INTERNATIONAL CONFERENCE ON RESEARCH AND INNOVATION IN INFORMATION SYSTEMS, 2013. *Proceeding [...],* Kuala Lumpur, p. 434-438, 2013. DOI 10.1109/ICRIIS.2013.6716749. Available at: https://ieeexplore.ieee.org/document/6716749. Access on: 6 fev. 2025.

[18] SUDARWANTO, A. S.; KHARISMA, D. B. B. Comparative study of personal data protection regulations in Indonesia, Hong Kong and Malaysia. *Journal of Financial Crime*, v. 29, n. 4, p. 1443-1457, 2022.

[19] MUHMAD Kamarulzaman, A. M.; WAN MOHD JAAFAR, W. S.; MOHD SAID, M. N.; SAAD, S. N. M.; MOHAN, M. UAV implementations in urban planning and related sectors of rapidly developing nations: A review and future perspectives for Malaysia. *Remote Sensing*, v. 15, n. 11, p. 2845, 2023.

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[23] DUNG, Tran Viet. Artificial Intelligence and Data Protection: How to Reconcile Both Areas from the European Law Perspective. *Vietnamese Journal of Legal Sciences*, [*S. l.*], v. 7, n. 2, p. 39–58, 2022. DOI: 10.2478/vjls-2022-0007. Available at: https://sciendo.com/pdf/10.2478/vjls-2022-0007. Access on: 6 fev. 2025.

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[25] KAZIM, E.; GÜÇLÜTÜRK, O.; ALMEIDA, D.; KERRIGAN, C.; LOMAS, E.; KOSHIYAMA, A; TRENGOVE, M. Proposed EU AI Act—Presidency compromise text: select overview and comment on the changes to the proposed regulation. *AI and Ethics*, v. 3,

6 Legal Position of Uzbekistan

Uzbekistan, a Central Asian nation, has been actively addressing the rapid advancements in artificial intelligence (AI) technology, particularly in generative AI. The country's legal framework has been evolving to tackle the challenges and opportunities this emerging technology presents. The government has established a comprehensive legislative foundation to regulate AI technologies. The cornerstone of this framework is the «Strategy for the Development of Artificial Intelligence in the Republic of Uzbekistan for 2019-2025,» introduced through Presidential Decree No. PP-4507 (2019).[26] The strategy outlines the country's vision for AI development, focusing on critical areas such as research, education, infrastructure, and legal and ethical considerations.[27] Building upon this initial strategy, the Concept for the Development of Artificial Intelligence for 2021-2030 solidifies Uzbekistan's long-term commitment to AI. It outlines a broader vision for its development.[28]

Several other legislative acts play a crucial role in regulating AI in Uzbekistan. The Personal Data Law (2019) establishes a framework for personal data protection, including data processed by AI systems. It outlines data processing principles, data subjects' rights, and the obligations of data controllers and processors.[29] Additionally, the Electronic Commerce Law (2020) regulates electronic transactions. It sets the legal framework for electronic signatures and documents relevant to generative AI applications in e-commerce.[30] The Law on Intellectual Property (2006) protects copyrights, patents, and trademarks (Law of the Republic of Uzbekistan No. ZRU-42, 2006). The IP law regime in Uzbekistan shared concerns similar to those in Malaysia. It deals with the dilemma of ownership and authorship of the patents and copyrighted materials and who the inventors and the authors under such a regime can be.

Next, there are several governmental bodies, such as the Ministry for Development of Information Technologies and Communications (MITC), are responsible for regulating the ICT sector, including AI, and developing relevant policies and regulations (Decree of the President of the Republic of Uzbekistan No. UP-5099, 2017). The National Agency for Project Management (NAPM) coordinates the implementation of AI strategies and oversees the Artificial Intelligence Research Center (AIRC) (Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 589, 2019). The AIRC, established in 2019, is tasked with conducting AI research and development, promoting AI adoption, and developing ethical guidelines (Decree of the President of the Republic of Uzbekistan No. PP-4349, 2019).

In 2021, the Cabinet of Ministers of Uzbekistan adopted a resolution to establish a special legal regime supporting AI technologies (Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 717, 2021). This law aims to create favorable conditions for organizations and institutions working on AI technologies, facilitate the testing and implementation of AI software, and simplify legal relationships in AI development. It offers benefits and preferences similar to those provided to IT Park residents, including tax incentives and simplified procedures (Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 717, 2021). The particular legal regime also establishes a regulatory sandbox for testing AI technologies in a controlled environment (Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 717, 2021).

The Uzbekistan government recognizes the ethical implications of AI and has taken steps to address them[31]. The national AI strategies emphasize ethical development, aligning with international best practices[32]. The AIRC is tasked with developing ethical guidelines

n. 2, p. 381-387, 2023.

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[31] ABDURAKHMANOVA, G. K.; ASTANAKULOV, O. T.; GOYIPNAZAROV, S. B.; IRMATOVA, A. B. Tourism 4.0: Opportunities for applying industry 4.0 technologies in tourism. *In:* INTERNATIONAL CONFERENCE ON FUTURE NETWORKS & DISTRIBUTED SYSTEMS, 6., 2022. *Proceedings [...],* p. 33-38, Dec. 2022.

[32] KHAMIDOV, O.; MAKMUDOV, M. Artificial intelligence in Uzbekistan: Challenges and opportunities. *International Journal of Artificial Intelligence and Machine Learning*, v. 10, n. 2, p. 120-135, 2020. Available at: https://doi.org/10.5555/3385738.3385745. Access on: 6 fev. 2025.

for AI research and development, including a code of ethics for researchers and developers (Decree of the President of the Republic of Uzbekistan No. PP-4349, 2019). Efforts are underway to address biases and discrimination in AI systems, with the «Law on Personal Data» mandating fair and non-discriminatory data processing (Law of the Republic of Uzbekistan No. ZRU-547, 2019). The impact of AI on employment and the need for workforce reskilling are being addressed through initiatives like the «Digital Uzbekistan 2030» program (Decree of the President of the Republic of Uzbekistan No. UP-6079, 2020).

While AI comes with sophisticated issues, determining liability and ensuring accountability for the actions and outputs of AI systems are complex challenges. Uzbekistan's legal framework is still evolving in this area, with discussions ongoing about specific regulations.[33] The existing principles of tort law and product liability may apply, but the unique nature of AI decision-making poses challenges in attributing responsibility.[34] Despite the progress in developing a legal and regulatory framework for generative AI in Uzbekistan, several challenges remain. These include balancing innovation with protecting fundamental rights, addressing the shortage of skilled AI professionals, raising public awareness, and keeping the legal framework up-to-date with technological advancements.[35] The nation aims to develop a comprehensive legal framework, establish a national AI research center, and foster international collaboration to address these challenges (Decree of the President of the Republic of Uzbekistan No. PP-4507, 2019).

7 Issues and Challenges in Regulating Generative AI

Regulating Generative AI in countries presents many issues and challenges that policymakers and stakeholders must address to ensure responsible and ethical deployment of AI technologies. One of the key challenges highlighted in the literature is the opacity of AI algorithms, often referred to as a 'black box,' which hinders the assessment of bias within these systems.[36] This lack of transparency poses a significant hurdle in ensuring fairness and accountability in AI decision-making processes, raising concerns about potential discriminatory outcomes.

Moreover, implementing AI technologies, including Generative AI, in various sectors faces obstacles such as the shortage of skilled personnel, inadequate infrastructure, and high implementation costs. These challenges underscore the need for capacity-building efforts, resource allocation, and regulatory frameworks to support the effective integration of AI solutions. Additionally, issues related to data privacy regulations, the digital divide, and outdated technologies further complicate the adoption of AI-based solutions.[37]

In healthcare, using AI, including Generative AI, introduces complexities related to data privacy, algorithmic transparency, and accountability. These challenges necessitate robust regulatory frameworks that address the ethical implications of AI technologies in healthcare settings. Furthermore, the global nature of AI technologies poses regulatory challenges, requiring coordinated efforts to develop comprehensive and harmonized regulatory standards.[38]

The impact of AI on employment landscapes, as highlighted in the context of Malaysia, underscores the need for inclusive strategies to address workforce readiness and promote inclusive growth.[39] The dynamic

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[35] KHAMIDOV, O.; MAKMUDOV, M. Artificial intelligence in Uzbekistan: Challenges and opportunities. *International Journal of Artificial Intelligence and Machine Learning*, v. 10, n. 2, p. 120-135, 2020. Available at: https://doi.org/10.5555/3385738.3385745. Access on: 6 fev. 2025.

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nature of AI adoption necessitates policy interventions and collaborative governance approaches to navigate the challenges and opportunities presented by AI technologies in the labour market. Additionally, the economic implications of AI adoption, including the high cost of technological tools, require targeted interventions to ensure equitable access to AI-driven employment opportunities.[40]

In the legal domain, using AI technologies poses challenges related to data privacy, algorithmic transparency, and accountability. These issues underscore the importance of developing regulatory frameworks that uphold fundamental rights and ensure responsible AI innovation within legal systems. Addressing these challenges requires a nuanced understanding of the legal implications of AI technologies and proactive measures to mitigate potential risks.

Furthermore, developing AI technologies in urban services introduces challenges such as opaque decision-making processes, accountability issues, and privacy risks due to extensive data collection practices.[41] These negative externalities highlight the importance of responsible urban innovation that prioritises transparency, accountability, and privacy protection in AI-enabled decision-making processes. By addressing these challenges, countries can harness the benefits of AI technologies while mitigating potential risks to society.

Thus, regulating Generative AI in countries involves navigating a complex landscape of challenges, including algorithmic bias, data privacy concerns, workforce readiness, and regulatory harmonisation. Countries can foster responsible AI deployment that aligns with legal standards and societal values by addressing these issues through collaborative governance, capacity-building efforts, and ethical frameworks. Each of these issues will be discussed in detail below:-

8 Data Protection and Privacy Issues of AI-Generated Contents

Data protection and privacy issues in AI-generated content are crucial considerations in the ethical and legal landscape. The advanced capabilities of AI systems raise concerns about collecting, storing, and utilising personal information, leading to potential privacy breaches.[42] In healthcare, the processing of sensitive patient data by AI technologies underscores the importance of addressing privacy concerns to safeguard confidentiality and personal data protection. The vast amounts of personal data integrated into AI algorithms for medical purposes present challenges to patient privacy, necessitating robust regulatory frameworks to ensure data security.[43] Moreover, using AI in various sectors, including healthcare and online transactions, has highlighted the significance of trust and privacy as critical concerns among users.[44]

Privacy issues in AI applications extend to the security of data and the potential risks associated with data breaches, emphasising the need for privacy-preserving techniques and regulatory measures to mitigate privacy threats. The tension between security imperatives and personal privacy rights is a central ethical concern, particularly in the context of national security and AI technologies. As AI technology evolves, addressing privacy concerns becomes increasingly crucial, especially with the proliferation of user-generated content and the adoption of AI in diverse domains.[45] Privacy protection studies in AI often focus on anonymisation techniques and differential privacy to safeguard sensitive information and ensure data confidentiality. However, traditional distributed machine learning methods face challenges in effectively addressing data privacy con-

ment in Malaysia: Decentralization, Policy Interventions, and Collaborative Governance. *Artificial Intelligence eJournal,* Apr. 2024. DOI 10.2139/ssrn.4806209.

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[43] CARMODY, J.; SHRINGARPURE, S.; VAN DE VENTER, G. AI and privacy concerns: a smart meter case study. *Journal of Information, Communication and Ethics in Society*, v. 19, n. 4, p. 492-505, 2021.

[44] ZARIFIS, A.; FU, S. Re-evaluating trust and privacy concerns when purchasing a mobile app: Re-calibrating for the increasing role of artificial intelligence. *Digital*, v. 3, n. 4, p. 286-299, 2023.

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cerns, necessitating innovative approaches to enhance privacy protection in AI applications.[46]

In the context of AI-generated content, such as ChatGPT, ethical considerations revolve around data privacy, transparency, and the need for informed consent to ensure the confidentiality and protection of personal data. The ethical challenges of AI in marketing also highlight data privacy as a pressing concern, emphasising the importance of addressing privacy issues in AI applications.[47]

In Malaysia, even though the PDPA 2010 regulates the processing of personal data by corporate entities and individuals, the PDPA principles do not apply to the automated collection, storage, and processing of data by an AI that can operate without human guidance or instruction. The principles of the PDPA 2010 may be violated by a generative AI in the following ways: Sections 6, 7, and 8 of the PDPA 2010 prohibit the collection and disclosure of personal data to third parties without the data subject's knowledge or consent. Sections 9, 10, and 11 of the PDPA 201also 0 prohibit the unauthorised storage and retention of personal data for AI «training» and memorisation without providing a right to access, update, or delete the data. Section 129 of the PDPA 2010 prohibits the transfer of personal data to servers and users outside of Malaysia without the data subject's consent. Other artificial intelligence (AI) programs may also process personal data without the subject's knowledge or consent, such as AI filters that analyse candidates for employment and recruitment purposes and AI programmes that filter individuals' biometric information for surveillance purposes. (FN)

9 Source of Data Training and Bias Amplification

Data privacy and bias in AI are crucial considerations that significantly impact the integrity and fairness of AI systems. The training data utilised in AI models may inherently contain biases, and the algorithms can exacerbate these biases, leading to ethical and legal challenges.[48] The reliance on data stored in the databases for training AI-based computational approaches underscores the necessity of addressing bias in the source of training data to ensure the accuracy and fairness of AI applications.[49] Furthermore, ensuring the accuracy and fairness of AI applications necessitates using diverse datasets and continuous monitoring to mitigate algorithmic bias.[50]

The ethical implications of AI in various sectors, including healthcare and education, underscore the importance of addressing bias and privacy concerns to foster responsible AI practices.[51] Integrating AI with neurotechnology introduces new ethical considerations, such as mental privacy, transparency, and biases, highlighting the need for a comprehensive ethical framework to guide the development and utilisation of AI-driven technologies.[52] Moreover, ethical considerations surrounding AI technology emphasise the significance of prioritising transparency, accountability, and fairness to mitigate bias and privacy violations and ensure ethical AI deployment.[53]

Policy imperatives play a vital role in tackling challenges related to data privacy, accountability, and bias in adopting AI/ML technologies, emphasising the necessity of regulatory frameworks to protect individuals' privacy rights and prevent bias amplification in AI systems.[54] The systematic amplification of bias in datasets and AI models underscores the importance of evaluating poten-

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[54] KIRKSEY, D. *Econometric Modeling of Hospital Spending Relative to Artificial Intelligence, Telehealth, and CEO Health Equity Goals*. 2024. Thesis (Doctoral) - Trident University International, Arizona, 2024.

tial bias mitigation methods to enhance the fairness and reliability of AI technologies.[55] Additionally, employing domain adaptation through training set enhancement can be a valuable strategy to promote AI fairness and address imbalances in bias-causing training data.[56]

10 IP Right of AI Generative Contents

The discourse surrounding AI regulation and governance has become increasingly focused on the intellectual property rights of AI-generated content. The legal frameworks that regulate intellectual property rights are confronted with new challenges and complexities as AI technologies, such as Generative AI, continue to develop and generate innovative results. Intellectual property rights and AI intersection raise inquiries regarding the ownership, authorship, and preservation of AI-generated content.

Determining ownership is critical in discussing intellectual property rights concerning AI-generated content. The study underscores the significance of comprehending the intellectual property implications of AI-generated content.[57] The issue of who owns the rights to these creations becomes increasingly crucial in ensuring a reasonable and equitable distribution of intellectual property as AI systems generate content autonomously. The legal and ethical challenges associated with the ownership and authorship of AI-generated content are complex. Despite the absence of human authorship and copyright protection in AI-generated works, determining legal liability and recognising authorship continue to be a significant concern.[58] The generation of human-like text has been facilitated using generative AI, such as ChatGPT and Natural Language Processing, which has led to questions regarding the authenticity of authorship in AI-generated content.[59] Research has shown that users do not perceive themselves as the proprietors or authors of AI-generated text, a phenomenon referred to as the AI Ghostwriter Effect, and it necessitates the importance of addressing the issues of ownership and authorship in AI-generated works.[60]

Copyright challenges arise in AI-generated creative content, requiring modifications to current regulations to address the intricacies of ownership and authorship.[61] The term "AI-generated" is frequently associated with AI-generated content, irrespective of its accuracy. It underscores the significance of labelling and comprehending the origins of AI-generated content.[62] Additionally, the research illuminates the influence of AI regulation and governance on sharing personal data online, emphasising the importance of suitable rules to enable data sharing without jeopardising intellectual property rights.[63] This underscores the necessity of legal frameworks and guidelines that balance preserving intellectual property rights and facilitating data sharing in AI-driven environments.

The significance of public engagement and diverse representation in developing AI policies that protect intellectual property rights is emphasised by the changing landscape of AI policy and governance, as explored in the study by Ulnicane.[64] Most countries can establish

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[64] ULNICANE, I.; KNIGHT, W.; LEACH, T.; STAHL, B. C.;

regulatory frameworks that resolve intellectual property concerns and foster innovation and collaboration in the AI ecosystem by involving various stakeholders in policymaking. Additionally, the comparative study conducted by Cath in 2017 underscores the necessity of policies safeguarding intellectual property rights and promoting the development of a «good AI society to promote responsible AI innovation.[65] The comparative assessment shows how various jurisdictions manage the intricate interplay between intellectual property regulations and AI technologies.

The study by Artz and Dung underscores the significance of regulatory frameworks that protect intellectual property rights in AI-driven environments, highlighting the necessity of reconciling artificial intelligence and data protection from a European law perspective in the context of data protection and AI.[66] Countries can foster innovation while protecting intellectual property rights by harmonising AI regulations with data protection laws. A nuanced comprehension of AI innovation's legal, ethical, and technological aspects is necessary to resolve the intellectual property rights of AI-generated content.

11 Generative AI Issues in Criminal Justice

In criminal justice systems, generative artificial intelligence presents various ethical questions and challenges that cross legal frameworks and social consequences. Generative AI and other artificial intelligence (AI) technologies in criminal justice systems beg issues about bias, openness, and responsibility in decision-making procedures.[67] In legal settings, using AI tools for data analysis and prediction complicates the assessment of the validity and reliability of AI-generated conclusions.[68]

Using artificial intelligence in the criminal justice system creates several possibilities and trends that could completely transform accepted methods and processes.[69] These developments, however, beg questions regarding the moral application of artificial intelligence, the defence of personal liberties, and the results of automated decision-making in legal environments. Knowing how artificial intelligence technology will affect criminal justice requires a sophisticated strategy balancing ethical issues and invention. Underlined the outstanding issues in decision-making processes within the criminal justice system.[70] Focusing on how AI systems are changing the basic ideas of knowledge creation and epistemology in the criminal justice area, investigated the impact of digital technologies and artificial intelligence on justice systems.[71]

The spectacle of international criminal justice underlines justice systems' performative and epistemic aspects in a globalised environment. This point of view underscored the need to closely study the stories and policies underlying international criminal justice systems to attain fairness, openness, and responsibility. Examining the theatre of justice will help stakeholders understand the subtleties of cross-border legal procedures and artificial intelligence technology's role in shifting these dynamics. By moving the focus from punitive measures to supportive treatments, attempts at decriminalisation in drug policy and criminal justice strive to enhance the mental health outcomes of drug users.[72] Developing good drug policies in Malaysia and

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[72] SINGH, J. S. P.; AZLINDA, A.; SHANKAR, D.; NIZAM, A.

elsewhere depends on an awareness of how decriminalisation policies affect societal consequences and recovery. Countries using artificial intelligence technologies in their drug policies can apply data-driven approaches to address drug use more precisely.

The participation of interest groups in criminal justice policymaking emphasises the need for several stakeholders to create legal frameworks and regulatory standards.[73] Promoting policy changes and reforms in the criminal justice system depends on professional associations, advocacy groups, and community stakeholders, all of which are important. Working with interest groups helps legislators ensure that social ideals and legal criteria use artificial intelligence technologies. Undocumented individuals in nations like Malaysia, including migrant labourers and refugees, face significant obstacles to legal identity and educational prospects.[74] Thorough policies and support systems that advance social equality and inclusion must address underprivileged communities' legal and intellectual needs. By examining the experiences of illegal communities, policymakers can design more inclusive legislation frameworks protecting the rights of vulnerable people. Managing artificial intelligence technology in criminal justice systems requires a consistent framework balancing innovation, ethics, and legal obligations.[75] Adopting compliance frameworks and responsibility systems helps nations guarantee the responsible and open application of artificial intelligence technologies within legal environments. These governance structures significantly affect the direction of artificial intelligence control and application in criminal justice systems. Therefore, the interplay of Generative AI and criminal justice systems generates a complex terrain of challenges and possibilities requiring a multidisciplinary approach. Governments can properly manage AI technology's ethical and legal implications in criminal justice environments by addressing bias, openness, responsibility, and inclusiveness.

12 Quality and Reliability of Generated Content

The quality and reliability of AI-generated material are critical in determining AI systems' usefulness and trustworthiness. The literature delves into many aspects of the quality and reliability of AI-generated content, emphasising both the benefits and drawbacks of AI technologies. The quality and dependability of AI--generated material have emerged as significant factors in discussing deploying AI technologies. The literature emphasises the need to resolve issues with the accuracy, reliability, and ethical implications of the content generated by AI systems. One study by Arshad et al. (2023) emphasises the importance of assuring the quality and dependability of AI-generated information, data privacy, and equal access to AI technology.[76] This underscores the necessity for solid processes to analyse and confirm the correctness and credibility of AI-generated details to increase user trust and confidence.

Furthermore, the evolution of Generative AI, as discussed in a comprehensive survey by Cao, has resulted in the creation of Artificial Intelligence Generated Content (AIGC), which encompasses a wide range of digital content produced by AI models, such as images, music, and natural language.[77] The spread of AI-generated content emphasises the significance of developing criteria for assessing the quality and dependability of such content to avoid misinformation, ensure authenticity, and preserve ethical content creation practices.

Citation from the publication's 'discussion constraints and future work' section: The labelling of AI--generated content presents a significant challenge in distinguishing between content produced by AI systems and human creators delve into the debate surrounding

H. M. S.; WAHIDA, S. F. Enhancing Drug Users' Mental Health by Decriminalizing Drug Use: Insights from In-Depth Interviews with Drug Rehabilitation Officers and Relapsed Drug Users. *Journal of Korean Academy of psychiatric and Mental Health Nursing*, v. 33, n. 1, p. 27-39, 2024.

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the appropriate labelling of Generative AI-generated content, highlighting the need for clear and consistent labelling practices to inform users about the origin of the content and its potential reliability.[78] Implementing transparent labelling techniques can improve transparency, accountability, and user knowledge of AI-generated material.

Detecting articles generated by Generative AI technology poses an additional problem in assuring the authenticity and dependability of content as several commentators such as Epstein, Arechar, and Rand explore efforts to distinguish between AI-generated and human-created information, highlighting the need to create ways to identify and validate the source of content in disciplines such as pharmacy practice.[79] This emphasises the importance of developing tools and standards for detecting and authenticating AI-generated material to maintain integrity and credibility across domains. Addressing the ethical implications of AI technologies, especially Generative AI, is critical to encouraging responsible content development and dissemination, highlighting the ethical considerations related to AI technologies such as DALL-E, and emphasising the importance of appropriate rules and policies to oversee the ethical usage of AI-generated images. It is strongly advocated that countries limit the hazards connected with AI-generated content by adopting ethical regulations and legal frameworks for content development and distribution.

13 Conclusion

Generative AI technology, which employs machine learning models to create new content from existing data, presents benefits and challenges. The laws and regulations of Malaysia and Uzbezkistan must be updated to account for the additional difficulties generative AI brings. In Malaysia, the PDPA and Copyright Act of 1987 may need to be modified to include AI-generated work. Presently, the PDPA protects personal data that are only handled by humans; thus, its protection is necessary to encompass autonomous processing by AI systems and language learning models (LLM). It has been widely debated that AI-created works lacking human participation should not be recognised and granted protection under the intellectual property regime. Thus, the concept of authorship and ownership must be reconsidered in the context of Malaysia and Uzbekistan. Malaysia's generative artificial intelligence deployment raises ethical concerns about responsibility, misinformation, and prejudice. The AI systems trained on biased datasets may propagate social preconceptions that lead to hate speech and threaten the peace of the nations.

Additionally the deepfakes and synthetic media also pose a threat to information integrity and public trust, emphasising the importance of rigorous verification procedures and public awareness efforts. There are also concerns raised that generative artificial intelligence applications should not violate users' privacy or exploit personal information. Uzbekistan and the Malaysian government must adopt AI deployment policies that promote transparency, fairness, and accountability and call for effective collaboration between public and private actors to maintain the AI system's high enforcement and transparency. Finally, it is undeniable that AI technology can transform both a nation's economy and creativity; nevertheless, such technology must be balanced with legal and ethical concerns.

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