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Liability Issues in the Context of Artificial Intelligence: Legal Challenges and Solutions for AI-Supported Decisions

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Artificial intelligence (AI), which enhances efficiency, production, and decision-making, has rapidly become a crucial component in sectors such as healthcare, banking, education, and transportation. However, as AI systems increasingly integrate into critical aspects of daily life, significant legal challenges related to liability, transparency, and accountability arise. The issue is that it can be challenging to assign blame for judgments made by AI, particularly when self-learning systems are involved and go beyond initial programming. In addition to algorithmic bias, opaque decision-making procedures, and third-party involvement, there are ambiguities in the assignment of accountability among developers, operators, and users. The purpose of this study is to discuss these legal issues and offer workable answers to guarantee fairness and responsibility in AI-assisted decision-making. In order to streamline compensation by emphasizing causality rather than culpability, key findings recommend the implementation of strict responsibility for high-risk AI applications. Accountability and traceability can be increased by increasing transparency through required paperwork and explainable AI systems. Uncertainty can be decreased by using explicit contractual frameworks to clearly define roles for developers, operators, and users. Furthermore, the creation of specialist liability insurance can promote the appropriate use of AI while providing financial protection for stakeholders. Building public trust and making sure AI advances society without endangering it needs striking a balance between innovation and moral and legal obligations. Cross-border AI applications require international harmonization of legal norms, such as the GDPR and the EU's AI Act, in order to establish a uniform regulatory framework. To ensure justice, fairness, and the well-being of society, these extensive legal reforms are required to close the gap between accountability and technological innovation.

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INTRODUCTION

Artificial intelligence (AI), with its profound impact on a variety of industries, including healthcare, banking, education, transportation, and entertainment, has become a vital part of contemporary life. AI enhances human experiences in a number of ways as it gets increasingly ingrained in daily life, such as social networking, online shopping, streaming services, and web browsing (Hernández et al., 2023). AI's analytical capabilities simplify tasks related to healthcare and customer service (Moravec et al., 2024). The shift to a "Feeling Economy" highlights emotional intelligence by allowing AI to handle data-driven activities while humans focus on duties requiring empathy and interpersonal contact (Huang et al., 2019; Dirican, 2015). These improvements in efficiency, accessibility, and convenience benefit customers worldwide and contribute to improvements in quality of life. By increasing global competitiveness and leveraging big data for decision-making, AI revolutionizes enterprises (Makridakis, 2017). There are notable increases in productivity, especially for low-skilled workers in developing countries (Ernst et al., 2019). AI adoption fosters innovation, competitive advantages, and economic growth.

New legislation and aggressive policies are required to address issues like inequality and job displacement in order to ensure equitable income distribution and sustainable growth (Ernst et al., 2019; Makridakis, 2017). Economic success requires striking a compromise between AI-driven efficiency and human-centred talents (Huang et al., 2019; Dirican, 2015). AI is driving societal transformation, offering increased productivity, economic growth, and better risk

management while raising concerns about job loss and skill retraining (Mateu & Pluchart, 2019). Seen as the "3rd economic transformation" (Baldwin, 2019), AI affects sectors like education, security, and employment. A 2021 Ipsos study of 19,504 individuals across 28 countries revealed anticipated AI impacts: 35% on education, 33% on security, 32% on employment, 31% on shopping, and lower percentages for transport, entertainment, cost of living, income, environment, food, and personal relationships (Trabelsi, 2024). A Goldman Sachs report (2023) predicts AI could impact 300 million jobs, automating 25% of the labour market, particularly in administrative, legal, and engineering fields.

Advanced economies will experience greater disruption. Despite challenges, AI could boost labour productivity and increase global GDP by 7% annually over a decade, signifying a pivotal technological shift (Trabelsi, 2024). There are several legal issues with AI-supported choices, such as privacy, bias, accountability, and transparency. According to Rodrigues (2020), vulnerable populations are more at risk from algorithmic discrimination, lack of contestability, and cybersecurity flaws. Upholding human rights requires ongoing assessment and flexible legal frameworks. In order to maintain equity and foster public trust, Gerke, Minssen, and Cohen (2020) highlight concerns related to data privacy, safety, and informed consent in the healthcare industry and advocate for reliable AI systems. Zhang (2024) shows how AI might increase the accuracy of legal judgments, but this creates questions regarding accountability and liability in the event of mistakes. Mecaj (2022) highlights the absence of complete legislative frameworks in spite of technical advancements.

Even though many nations are creating rules pertaining to AI, there are still gaps in addressing the technology's pervasive influence and related hazards. All things considered, these difficulties call for strong legal frameworks to strike a balance between innovation and moral principles, guarantee justice, defend rights, and lessen the possible harm that AI could cause to society. This study aims to investigate the legal issues raised by AI-supported choices and offer workable answers to liability problems. At the heart of our inquiry is the question: What new steps are required to guarantee justice and accountability in AI-supported decision-making, and how can current legal systems adjust to the particular difficulties presented by AI? This question is especially pertinent as AI begins to infiltrate important spheres of society, where bad choices can have far-reaching effects on both people and organizations. In order to present a thorough analysis, this study will explore the nuances of liability in AI by looking at case examples, governmental initiatives, and scholarly viewpoints. It seeks to add to the continuing conversation on how to balance technical advancement with moral and legal responsibility by bringing attention to both problems and possible answers. By doing this, it aims to close the gap between legal developments and technological innovation, guaranteeing that the advantages of AI are realized without sacrificing equity, justice, or public confidence.

Basics of Artificial Intelligence

Because artificial intelligence (AI) is dynamic and has many concepts, defining it has proven challenging. In general, artificial intelligence (AI) refers to computer programs created to carry out operations like speech recognition, visual perception, decision-making, and language translation that normally demand human intelligence (Pellicelli, 2023). The study of building computers that behave intelligently is the main focus of early definitions of artificial intelligence (Kok et al., 2009). AI is described as a computerized system that exhibits behaviour requiring intelligence (Pellicelli, 2023).

Algorithms, machine learning, and data processing are essential to AI's ability to recognize patterns and automate difficult jobs. The adoption of AI, especially voice assistants, depends on user trust; functionality trust has a greater impact on usage than human-like traits (Choung et al., 2022). AI improves decision-making in a variety of domains by increasing autonomy, accuracy, and efficiency.

AI in healthcare facilitates predictive analytics, individualized treatment plans, and diagnosis. It supports algorithmic trading, risk assessment, and fraud detection in the financial industry. AI-powered demand forecasting, inventory control, and logistics optimization are advantageous to supply chains. AI in education makes automated grading and tailored learning possible. AI is used in the legal industry to analyze documents and make legal predictions. While marketing uses AI for customer segmentation and recommendation systems, public safety uses AI for emergency response and predictive policing. AI adoption is influenced by trust and utility, while frameworks prioritize autonomy and task performance (De Zúñiga et al., 2023). Understanding the various ways AI systems function is essential as it continues to impact decision-making in a variety of industries. In particular, AI can be divided into assistive and autonomous systems, each of which has a unique function in the formulation and application of choices. Autonomous systems make decisions on their own without assistance from humans (Gonçalves et al., 2024).

For environmental adaptation and response, they rely on sensors, AI algorithms and real-time data. Autonomous drones and self-driving cars are two examples of technology that can navigate and carry out activities without direct human supervision (Evangelopoulos, 2022). These systems are intended for situations in which autonomous, real-time decision-making is important. Although they facilitate human decision-making, assistive systems still need human supervision and input (Tsamados et al., 2024). AI-powered healthcare diagnostic tools and e-commerce recommendation systems are

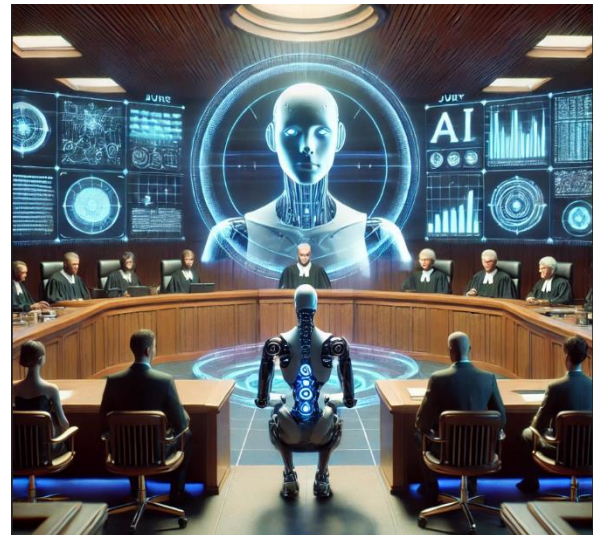
two examples (Iqbal et al., 2024). Humans still make the final decisions, but these systems increase efficiency by offering data-driven insights. Recognizing suitable use cases, assessing accountability for mistakes, and resolving ethical issues with AI's involvement in decision-making processes all depend on an understanding of these distinctions.

Liability law principles

AI and other emerging technologies pose a variety of liability issues. Although electronic personhood implies giving AI legal rights and obligations, this strategy is undermined by ethical issues and practical issues, such as AI's lack of funding (Wendehorst, 2020). AI liability frameworks need to strike a balance between fairness, innovation, and risk management. Although it depends on intricate legal frameworks, non-compliance liability links accountability to transgressions of certain legislation, such as GDPR. While defect liability tackles product flaws, it has trouble keeping up with the complexity and autonomy of AI (Wendehorst, 2020). A fundamental component of European law, fault liability holds people responsible when carelessness or a duty breach results in injury (Benhamou & Ferland, 2020). However, AI's autonomy and opacity make it challenging to assign purpose or negligence, which is a problem for blame liability (Marchisio, 2021). Though its stringent rules run the danger of burdening customers, the European Parliament's proposal establishes fault-based accountability for AI systems. Increased responsibilities of care and shared liability among stakeholders may be necessary to address AI's independent nature.

Strict liability, which holds parties accountable regardless of fault, may be preferred in situations where risks are unclear or harm is hard to identify (Zech, 2021; Heiss, 2020). Strict liability is appropriate for high-risk AI applications because it streamlines compensation by concentrating only on causation (Wendehorst, 2020). This strategy encourages better risk management and safer AI development. Transparency and accountability are improved by proportionate liability models,

which divide risk between developers and users (Bashayreh et al., 2020). Furthermore, as long as stakeholders show adherence to standards, no-fault redress programs provide compensation without impeding innovation (Marchisio, 2021). To promote scientific advancement while guarding against the dangers posed by artificial intelligence, public policy must carefully strike a balance between these ideas.



Created with ChatGPT: Law, AI, Courtroom

Relevant National and International Legal Sources and Standards

National and international legal systems work together to determine who is responsible for harm caused by AI. Important rules in the European Union (EU) offer direction for controlling AI dangers. Non-compliance liability is established by the General Data Protection Regulation (GDPR), specifically Article 82, which holds parties responsible for violations of data protection requirements (Truli, 2018; Van Alsenoy, 2016). Furthermore, defect responsibility is covered under the Product responsibility Directive (PLD) (85/374/EEC), which guarantees that customers may pursue damages for injuries brought on by faulty goods (Machnikowski, 2016; Wuyts, 2014). A standardized approach is presented in the European Parliament Proposal (EP Proposal) for a Regulation on AI Liability, which suggests fault-based liability for other AI systems and strict liability for high-risk AI applications. The OECD

AI Principles (2019) place a strong emphasis on responsible AI development on a global scale, encouraging openness, responsibility, and risk management (Clarke, 2019). ISO/IEC 23894:2023 offers comprehensive guidelines for managing AI risks that support these ideas by emphasizing safety, dependability, and adherence to best practices (Oveisi, et al., 2024; Polemi et al., 2024). Determining AI culpability also heavily relies on national regulation. The German Civil Code (BGB), which emphasizes carelessness and duty of care, applies fault-based liability concepts to injury caused by AI (Maroudas, 2024). Tort law has been modified in the US to handle the particular difficulties posed by AI, including its autonomy, opacity, and unpredictable nature (Polemi et al., 2024; Lai, 2021; Hacker et al., 2020). These legal frameworks encourage the creation of safer and more dependable AI systems while guaranteeing that victims of harm caused by AI can pursue just compensation. In the quickly developing field of artificial intelligence, these national and international standards together seek to strike a balance between innovation, responsibility, and consumer protection.

Distinction between civil and criminal liability

The objectives, processes, and results of criminal culpability and civil liability are distinct. Conflicts between individuals, organizations, or companies that typically arise from harm or loss caused by negligence, breach of contract, or other misconduct are covered by civil responsibility. Restitution for the victim's injuries is the aim. In civil litigation, the victim or claimant brings the action, and the burden of proof is typically "on the balance of probabilities" (more probable than not). Examples include cases involving product defects, bodily injury, and data breaches. Remedial measures may involve monetary awards or orders to do or cease particular actions (Callaghan & Callaghan, 2024; Buckner, 2007; Hay, 2015). In contrast, criminal responsibility relates to actions deemed detrimental to the state or society. The goal is to punish the perpetrator and discourage similar behaviour in the future. In criminal proceedings, which are pursued by the

government or public prosecutor, the burden of proof is "beyond a reasonable doubt." Penalties, jail time, community service, or probation are all possible outcomes of criminal culpability. AI-related data theft, fraud, and cybercrime are a few examples. Last but not least, civil liability focuses on resolving conflicts between parties and offering compensation, whereas criminal liability seeks to punish and prevent violations of the law and social norms (Scott, 2009; Jani & Rathor, 2024).

TYPICAL LIABILITY SCENARIOS FOR AI-SUPPORTED DECISIONS

Incorrect Decisions by AI

Inaccurate AI-supported decisions have the potential to cause serious harm and legal issues as AI is incorporated more and more into decision-making processes. Various sources of inaccuracy frequently lead to incorrect AI choices, such as incorrect credit approvals or misdiagnoses in medicine. Patient safety is impacted by diagnostic errors in healthcare, which are largely caused by cognitive biases and a lack of analytical reasoning (Neale et al., 2011). Due to knowledge gaps in recognizing illness evidence, misdiagnoses are common in disciplines including pulmonology and dermatology (Moon & Yoo, 2021). Error rates rise as a result of medical students' difficulties with diagnostic abilities and context creation (Braun et al., 2017). Furthermore, these errors may be amplified by AI diagnostic tools, necessitating new epistemic responsibilities to handle hybrid AI-human judgments (Babushkina, 2022). The source of the error which could be the algorithm, the data, or human error determines who is liable for AI mistakes. Developers are held accountable when algorithm problems arise as a result of poor coding or implementation. When training data is skewed, lacking, or out-of-date, data basis mistakes occur, pointing fingers at the data curation team. Professionals who use AI for human intervention run the risk of being held partially responsible for errors if they rely too much on AI or fail to see warning indications. Finding these sources is essential for establishing responsibility and making sure AI-supported

decisions are handled accurately and morally, particularly in vital industries like healthcare (Buiten et al., 2023; Ahmad et al., 2023; De Sio & Mecacci, 2021).

Wrong Decisions in Credit Applications

AI is used extensively in the financial industry to assess creditworthiness by examining spending trends and financial histories (Brown, 2024; Sadok et al., 2022; (Amato et al., 2024). Financial harm can arise from AI system errors that lead to unfair credit approvals or denials for high-risk customers. The algorithm, when faulty, misunderstands data patterns, leading to mistakes. If biased algorithms, for instance, disproportionately reject applicants from particular demographics, resulting in discrimination claims, developers or financial institutions may be held liable. Basis of Data Inaccurate or out-of-date credit information leads to errors. Liability may be imposed on those in charge of supplying or storing such data. When finance officials rely entirely on AI without verification, human intervention errors occur. If human supervision processes are not followed, wrong judgments may result in shared liability (Griffith, 2023; Gautam, 2023; (Garcia et al., 2023; Ferrara, 2023).

Finding the Sources of Mistakes

Although the intricacy and opacity of AI systems make this challenging, determining the causes of failures is crucial in AI liability trials (Buiten et al., 2023; Buiten, 2024; Cheong, 2024). It is necessary to conduct thorough validation procedures prior to deployment because algorithm design and development faults are caused by faulty reasoning, inadequate testing, or code flaws. Because AI depends on massive datasets, biases, mistakes, and out-of-date information can undermine choices, necessitating frequent data audits and upgrades. Operators who over-rely on AI without proper validation or fail to identify problems are subject to human monitoring and intervention. System opacity, sometimes known as AI's "black-box" characteristic, makes error tracing more difficult and emphasizes the

necessity of transparent systems with definable decision-making procedures (Murikah et al., 2024; Chen, 2023; Chen et al., 2023).

Legal and Moral Aspects to Consider

Liability for poor AI judgments must strike a balance between innovation and accountability. The General Data Protection Regulation (GDPR) and the proposed EU AI Act are two examples of legal and ethical criteria that developers, operators, and users must abide by in order to maintain data protection, fairness, and transparency. While promoting trust in AI technologies, policies like proportionate responsibility models, strict liability for high-risk applications, and no-fault compensation plans can be put into place to help handle the difficulties caused by poor AI judgments (Buiten et al., 2023; Montagnani et al., 2024).

Autonomous Systems and Accidents

Artificial intelligence (AI) technology has advanced significantly with autonomous systems, especially autonomous vehicles (AVs) (Garikapati & Shetiya, 2024). To navigate roadways and make snap judgments without human assistance, autonomous cars rely on sensors, machine learning algorithms, and real-time data processing. Autonomous vehicles are not impervious to accidents, even if they promise safer mobility by reducing human mistakes (Giannaros et al., 2023; Almaskati et al., 2024). Autonomous vehicle incidents, like the 2018 Arizona deadly accident involving an Uber self-driving car, highlight how difficult it is to determine who is at fault in an accident. It can be difficult to pinpoint the error's origin in certain situations. According to DeArman (2019), the reasons may include algorithmic mistakes, sensor issues, misinterpreted data, or external influences that the system is unable to sufficiently handle. Who should be responsible for the harm that results, for instance, if an autonomous car misses a pedestrian because of improper sensor calibration or an algorithm that can't properly interpret data?

A thorough grasp of the roles and duties of the several parties engaged in the deployment of autonomous cars is necessary due to this complexity (Zhang et al., 2023; Uzair, 2021; Galvão and Huda, 2023). In order to ensure safety, manufacturers of autonomous vehicles and the AI systems that drive them are essential (Garikapati and Shetiya, 2024). Among their duties is the design, development, and thorough testing of autonomous car systems in order to detect and reduce possible hazards. Under product liability rules like the EU Product Liability Directive (85/374/EEC) or the U.S. Tort Law, the manufacturer may be held accountable if an accident happens as a result of design defects, software bugs, or insufficient testing (DeArman, 2019; White, 2017; Dundic, 2009). The manufacturer may be liable for the flaw, for instance, if a flawed algorithm misinterprets sensor data or fails to identify traffic risks. In order to guarantee continued performance and safety, the manufacturer is also responsible for doing routine software upgrades and maintenance.

Autonomous systems frequently still need some degree of human supervision. It is the duty of operators who keep an eye on or step in during autonomous vehicle operations to behave correctly in emergency scenarios. An operator may be held partially liable for the accident if they neglect to take the required corrective action, such as overriding the system when a clear error arises (Sever and Contissa, 2024; Giannaros et al., 2023). Operators who neglect to exercise due diligence, such as choosing appropriate systems, making sure maintenance is done, or efficiently monitoring the autonomous vehicle's operations, may be held liable under the EP Proposal for AI Liability (Nikolinakos, 2024; White, 2017). Depending on their involvement in the occurrence, consumers and other end users of autonomous vehicles may also be held partially liable. According to the manufacturer's instructions, users are in charge of maintaining the car and applying any upgrades that are required (Geistfeld, 2017; Adnan et al., 2018). The user may be held partially or entirely liable for an accident that happens as a result of improper

maintenance of the autonomous vehicle or system manipulation.

However, when autonomous vehicles are built to function on their own, it becomes more contentious to hold users accountable because users might lack the technological know-how to properly step in. In conclusion, determining the cause of the error and the role of each stakeholder is essential to defining who is responsible for what in autonomous vehicle accidents. Liability must be distributed equitably in a balanced legal system that fosters innovation and safeguards public safety (Sever & Contissa, 2024; Hevelke & Nida-Rümelin, 2014).

Discriminatory Decisions

Bias in Recruitment Algorithms

Artificial intelligence (AI) is being utilized more and more in hiring procedures to expedite the screening of resumes, candidate evaluations, and even preliminary interviews (Rathore, 2023; Horodyski, 2023). These systems are susceptible to prejudices, though, which may result in discriminating judgments. One prominent example is the AI hiring tool used by Amazon, which was discontinued in 2018 after it was seen to favour men for technical positions (Dastin, 2018). Previous hiring data, which represented gender biases in the IT sector, had been used to train the system. As a result, the AI treated female applicants unfairly by downgrading resumes that contained phrases related to women (Dastin, 2018). The training data, algorithm design, and output interpretation are some of the common causes of bias in recruiting algorithms. The AI is likely to reinforce biases if historical data shows discriminatory actions. Additionally, the opaqueness of AI decision-making sometimes known as the "black-box" problem makes it difficult to identify and correct these biases (Albaroudi et al., 2024; Chen, 2023; Varsha, 2023).

Discrimination and Unequal Treatment's Legal Consequences

AI-generated discriminatory judgments have serious legal ramifications, especially when it comes to anti-discrimination legislation and equal treatment principles (Rodrigues, 2020; Borgesius, 2020). Laws in many jurisdictions shield people from discrimination on the basis of traits like gender, colour, age, and disability. The General Data Protection Regulation (GDPR) of the European Union forbids automated decision-making that leads to discrimination. People have the right to challenge judgments made only by automated systems under Article 22 of the GDPR if such decisions have a substantial impact on them (Bayamlıoğlu, 2021). The EU Charter of Fundamental Rights also forbids discrimination and ensures equal treatment. Businesses that use AI for hiring must have safeguards in place, like frequent audits and bias detection tools, to guarantee adherence to these legal requirements (Geburczyk, 2021).

Employment discrimination is illegal in the US under the Equal Employment Opportunity Commission's (EEOC) rules and the Civil Rights Act of 1964. Employers may be held accountable under these rules if an AI recruitment tool leads to unequal treatment or impact. For example, if a protected group is disproportionately disadvantaged by a recruitment algorithm, the employer must show that the AI system is required and that there are no less discriminating options (Rodriguez, 2023; Friedman and McCarthy, 2020). Businesses must implement measures to reduce prejudice in AI systems in order to stay out of trouble with the law and guarantee equitable treatment. Making sure datasets are representative of many demographic groups and diverse is part of this. Frequent audits of AI systems ensure fairness by identifying and addressing biases. AI design must be transparent, with systems giving concise justifications for their choices. AI-generated recommendations are examined and verified by human judgment when human oversight is combined with AI (Chadha, 2024; Ferrara, 2023). If discriminating decisions

are made, employers, developers, or both may be held accountable. Employers must supervise the use of AI technologies to guarantee adherence to legal requirements, while developers are in charge of developing objective algorithms. If businesses ignore recognized prejudices or fail to put in place the required precautions, courts may hold them accountable (Nazer et al., 2023).

In conclusion, AI systems that make biased decisions present serious moral and legal issues. Transparency, proactive bias reduction, and adherence to anti-discrimination legislation are crucial for preventing unfair treatment and safeguarding people's rights in AI-driven operations.

CURRENT LEGAL SITUATION

EU Law

The Artificial Intelligence Act (AI Act) is a historic legislative proposal in the European Union that aims to regulate AI technologies in order to guarantee responsibility, safety, and transparency. The AI Act, which was introduced by the European Commission in 2021, divides AI systems into risk categories that range from low risk to unacceptable and high risk. Strict regulations, including risk assessments, transparency requirements, and human monitoring, apply to high-risk AI applications, such as those in healthcare, law enforcement, and transportation. By guaranteeing that AI systems adhere to safety regulations and basic rights, the AI Act highlights the necessity of reliable AI. The EU's commitment to creating a strong regulatory framework for AI is demonstrated by the substantial fines that can be imposed for noncompliance (Evers, 2024; Palladino, 2021; Ebers et al., 2021).

Another essential component of EU law is data protection, which is mainly controlled by the General Data Protection Regulation (GDPR) (Andraško et al., 2021). Strict guidelines for processing personal data are enforced by the GDPR, especially when AI systems are used to make automated decisions. People have the right to challenge judgments made only by automated

systems under Article 22 of the GDPR if such decisions have a substantial impact on them (Bayamlioğlu, 2021). To ensure that data is handled equitably and legally, AI systems must also go by the concepts of accountability, transparency, and data minimization. Businesses using AI must put in place measures to secure personal information, such as data encryption, anonymization, and frequent audits to find and reduce risks. The GDPR's emphasis on data protection and privacy guarantees that AI development and application respect people's liberties and rights (Geburczyk, 2021; Roig, 2017).

National Law

AI liability laws in Germany are mostly based on pre-existing legal frameworks, such as the Product Liability Act (Produkthaftungsgesetz) and the German Civil Code (BGB) (Von Bodungen & Steege, 2024; De Graaf & Veldt, 2022). Fault-based responsibility under the BGB makes people or organizations liable for losses brought on by carelessness or duty violations (Van Gool, 2024). When mistakes are made in AI systems as a result of poor design, insufficient testing, or inadequate oversight, this principle is applicable. Furthermore, producers are subject to strict liability under the Product Liability Act for flaws in their goods, including AI-driven gadgets. Regardless of guilt, the maker may be held accountable if an autonomous system like a self-driving car causes harm because of a flaw (Riehm & Meier, 2019). The way German courts handle liability related to AI is demonstrated by a number of case studies. The court held a financial organization accountable for discriminatory results caused by biased algorithms in a case concerning automated decision-making in the financial services industry. This specific case involved an algorithm that disproportionately disadvantaged applicants from certain demographic groups, leading to claims of discrimination. The court underlined how crucial human supervision and caution are when implementing AI systems.

A court ruling in a different medical AI instance held the software developer and the healthcare provider jointly liable for a misdiagnosis. This case involved an AI system that failed to accurately diagnose a condition, emphasizing the necessity of transparency and accountability in AI-assisted decision-making.

These instances demonstrate Germany's focus on striking a balance between consumer protection and innovation, as well as making sure that the right people are held accountable (Schuster, 2009; Van Gool, 2024).

International Perspective

The frameworks and aims of the European and American approaches to AI liability and regulation are very different. The EU takes a rights-based and precautionary stance, emphasizing the defence of safety, privacy, and basic rights. This commitment is reflected in the GDPR and the planned AI Act, which place strict limitations on high-risk AI applications and guarantee accountability, transparency, and human oversight. In order to discourage unethical AI methods, the EU places a strong emphasis on proactive regulation to reduce dangers before they become real and impose severe fines for noncompliance (Kuzior, 2024). The US, in contrast, favours innovation and self-regulation and adopts a more sector-specific and market-driven strategy. The United States addresses AI-related issues through existing laws, such as the Civil Rights Act, Federal Trade Commission (FTC) guidelines, and state-level legislation, rather than enacting a complete AI law. In the United States, tort law which emphasizes carelessness and product liability is frequently used to decide liability. Instead of implementing extensive legislative reforms, the U.S. legal system typically uses litigation and case law to handle AI concerns (Mann et al., 2024). Although this strategy promotes technical development, it may result in inconsistent and fragmented regulation across many jurisdictions and industries. The U.S. places more emphasis on innovation and adaptability than the EU does on ethical AI and consumer protection. To address

the ethical, legal, and societal issues raised by AI, both jurisdictions are realizing more and more that balanced regulation is required. To handle cross-border AI applications and guarantee uniform global procedures, international collaboration and standardization of AI standards are still essential (Zhuk, 2023).

CHALLENGES AND GAPS IN EXISTING LAW

Traditional legal frameworks now face several difficulties as a result of artificial intelligence (AI), especially when it comes to establishing who is responsible for choices made by AI systems. The traceability of choices, third-party liability, and self-learning algorithms all pose serious flaws in the current legal framework. For AI-supported judgments to be transparent, equitable, and accountable, these issues must be resolved.

Allocation of Responsibility in Self-Learning Systems

Particular challenges for self-learning systems, particularly machine learning-based ones, arise from the allocation of duties. Feedback and data input cause these systems to adapt, often making decisions that their designers did not fully anticipate. Unlike conventional software, which follows clearly stated rules when making decisions, self-learning AI might alter its behaviour over time, making it difficult to place blame for errors. When something goes wrong, this uncertainty complicates the question of who should be held accountable. Conventional liability models often hold the creator, manufacturer, operator, or user responsible. These differences are confused by self-learning systems, though. For instance, it may not be clear who is at fault if a self-learning algorithm in an autonomous vehicle learns to misread traffic signs and causes an accident; the driver, the manufacturer that installed the algorithm, or the program's original developer. Such circumstances are beyond the scope of current legal systems, such as the German Civil Code (BGB) and the EU Product Liability Directive (85/374/EEC) (Von Bodungen & Steege, 2024). The concept of electronic

personhood exacerbates this issue by arguing that AI systems could be viewed as legal entities with rights and responsibilities. But because of ethical and practical issues, like the paucity of funding for AI, this idea is controversial (Wendehorst, 2020). When it comes to self-learning systems, assigning accountability may require a multi-tiered approach that considers the roles of developers, manufacturers, operators, and users. By using this method, liability is distributed based on each party's level of influence over the AI system (Marchisio, 2021). More specific guidelines for accountability, supervision, and risk management are needed to bridge this gap.

Lack of Clarity Regarding Third-Party Liability

The uncertainty around third-party liability in judgments aided by AI is another major obstacle. Although third parties can affect how well AI systems perform, current legal frameworks frequently fall short in addressing their role. Examples of these parties include data providers, software vendors, and maintenance contracts. For instance, it becomes difficult to determine liability if a medical diagnostic tool driven by AI generates an inaccurate diagnosis because of faulty data from a third-party vendor. Is it the duty of the healthcare provider, the AI tool creator, or the third-party data provider? The EU General Data Protection Regulation (GDPR) and other current legal frameworks mostly address data controllers and processors, but they do not explicitly address the obligation of third parties using AI systems (Van Alsenoy, 2016). Third-party responsibility can be addressed in the United States through tort law and contract law, however, both strategies are frequently incompatible and differ depending on the jurisdiction (Polemi et al., 2024). Third-party responsibility also gets even more problematic when it comes to distributed AI systems, including those that use blockchain or cloud computing. In these situations, a number of people are involved in the system's functioning, making it challenging to assign blame when mistakes are made. To overcome these obstacles, legal frameworks must establish more precise

guidelines for shared liability, guaranteeing that third parties are held responsible when their actions cause harm. It may be more equitable to use a proportionate liability model that allocates accountability according to the level of power and influence each stakeholder has over the AI system (Bashayreh et al., 2020).

Technical and Legal Difficulties in the Traceability of Decisions (Explainability and Accountability)

Many times called the "black-box" dilemma or the explainability problem, one of the most important problems in AI liability is how hard it is to figure out what actions AI systems take. Artificial intelligence systems that use deep learning, in particular, often work in ways that are hard for humans to understand. This lack of openness complicates attempts to assign responsibility and guarantee accountability by making it hard to comprehend how a specific decision was reached (De Sio & Mecacci, 2021). For instance, if an AI system rejects a loan application in the financial services industry, the applicant might find it difficult to comprehend the rationale behind the decision. In addition to undermining confidence in AI systems, this explainability problem also interferes with judicial procedures that demand unambiguous proof of negligence or guilt (Buiten et al., 2023). An AI diagnostic tool that produces inaccurate results without an understandable explanation poses serious problems for healthcare professionals as well as patients seeking assistance (Babushkina, 2022). This problem is addressed by the GDPR, which requires "meaningful information about the logic involved" in automated judgments (Article 22).

However, the legislation does not require complete explainability, which leaves space for interpretation (Bayamlıoğlu, 2021). The proposed EU Artificial Intelligence Act places a strong emphasis on openness and mandates that high-risk AI systems furnish thorough justifications and documentation. It is still technically difficult to make big AI systems explainable. From a legal perspective, the concept of responsibility and due process is complicated by the difficulties in

tracking down judgments. When users and developers are unable to articulate the reasoning behind an AI system's decisions, it becomes difficult to assign blame for mistakes. Underpayment of victims and legal ambiguity may result from this lack of traceability (Heiss, 2020). It is imperative to provide technical solutions that improve AI explainability in order to overcome these obstacles, such as interpretable machine learning methods and algorithmic transparency tools.

Legal frameworks should also require that AI development processes, including the design, training, and deployment stages, be documented in order to guarantee that decisions can be linked to particular actions or inactions (Zhang, 2024). In order to guarantee that AI systems are transparent and that stakeholders are held responsible for their choices, accountability procedures like audits, impact assessments, and oversight committees can be helpful (Gerke, Minssen & Cohen, 2020). To sum up, the problems in assigning accountability for self-learning systems, the ambiguity around third-party liability, and the challenges in tracking down AI decisions point to serious flaws in the current legal frameworks. A mix of technological developments, more precise legislative requirements, and strong accountability systems are needed to address these issues and guarantee that AI development and application are in line with moral standards and public expectations.

PROPOSED SOLUTIONS AND REFORM APPROACHES

The rapid integration of artificial intelligence (AI) into various sectors necessitates a comprehensive legal framework to address emerging liability challenges. The complexities associated with self-learning systems, opaque decision-making processes, and the involvement of multiple stakeholders demand innovative approaches to ensure fairness, accountability, and transparency (Akpuokwe et al., 2024; De Almeida et al., 2021). This section proposes several solutions and reform strategies to bridge the gaps in existing

legal structures and create a robust liability framework for AI-supported decisions.

Establishment of Particular Liability Regimes: Strict Liability for AI Systems Proposal

The implementation of certain liability regimes, especially strict liability, is one of the best strategies to solve liability issues with AI systems. Strict responsibility holds a party accountable for damages brought about by AI systems, regardless of negligence or fault. By concentrating only on whether the AI system caused harm rather than demonstrating purpose or negligence, this method streamlines the process of determining responsibility. Strict liability is especially suitable for high-risk AI applications with substantial potential for harm, like financial services AI systems, medical diagnostics, and driverless cars. These high-risk applications involve scenarios where mistakes could have dire repercussions, yet because AI is autonomous, it can be challenging to assign blame. Strict liability, for example, would guarantee that victims of accidents involving self-driving cars receive compensation without having to deal with the difficulties of establishing fault (Heiss, 2020; Wendehorst, 2020). A stringent liability regime for high-risk AI systems has previously been proposed in the European Parliament's Proposal for a Regulation on AI Liability. In order to guarantee that victims of AI-related injury receive fast and equitable compensation, this proposal seeks to establish a uniform legal standard among EU member states. Developers and operators of high-risk AI systems would have to preserve financial stability, such as liability insurance, to cover possible damages in order to support this strategy (Marchisio, 2021). By putting the responsibility for ensuring that AI systems fulfil strong safety requirements on developers and manufacturers, strict liability for AI systems promotes safer AI development and improved risk management. By offering a transparent and predictable compensation system for individuals harmed by AI, it also fosters public confidence in the technology.

Enhancing Transparency and Traceability: Conditions for AI Decision Documentation and Traceability

To deal with liability in AI systems, transparency and tracking are very important. A lot of AI models, especially those that use deep learning, are "black boxes," which means it can be hard to figure out how they make decisions. To make AI decisions more accountable, rules must be made for how they should be recorded and tracked. Enforcing comprehensive documentation at each stage of the AI lifecycle, design, development, training, deployment, and operation, is one strategy to solve this problem. It is advised that developers maintain detailed records of the data sets, algorithms, and decision-making processes that the AI system uses. This record may serve as a "decision audit trail," allowing stakeholders to identify the source of mistakes (Gerke, Minssen, & Cohen, 2020). Furthermore, by providing human-readable explanations for AI decisions, explainable AI techniques might increase transparency. To help medical professionals understand and validate the AI's conclusions, medical diagnostic AI systems, for example, should provide a clear explanation of their diagnoses (Babushkina, 2022). AI-driven credit assessment systems in the financial services sector should also include explicit explanations for loan approvals or denials in order to preserve equity and accountability (Buiten et al., 2023). Regulatory agencies should set standards for openness and documentation in order to carry out these duties. The EU's Artificial Intelligence Act already puts a lot of weight on making sure that high-risk AI systems are open and honest. To make sure that these rules are being followed, they need to be expanded to include regular audits, impact assessments, and certification methods. By doing these actions, AI systems will operate within ethical and legal parameters, promoting responsibility and confidence.

Responsibility Sharing Among Developers, Users, and Operators: Clearly Defined Duties in Contracts and License Agreements

Clarifying accountability in decisions aided by AI requires a division of responsibilities among developers, users, and operators. Clear obligations must be established through contracts and license agreements in order to do this. Each party's responsibilities and functions in the implementation and use of AI systems should be outlined in these agreements. It should be the duty of developers to guarantee that AI systems are created, examined, and verified in compliance with legal requirements and industry standards. This entails correcting any potential biases, guaranteeing the accuracy of the data, and offering frequent updates and upkeep. Contracts ought to outline the developer's responsibility for mistakes or malfunctions brought on by poor design or insufficient testing (Von Bodungen & Steege, 2024). It should be the duty of operators who implement and manage AI systems to keep an eye on system performance, spot irregularities, and take appropriate action. Operator responsibilities for guaranteeing appropriate use, upkeep, and supervision of AI systems should be specified in contracts. Operators of autonomous vehicles, for example, must be obligated to keep an eye on how the vehicle is operating and take corrective action when AI mistakes are identified (Sever & Contissa, 2024). It should be the responsibility of users, especially end users, to maintain AI systems in accordance with developer rules, which include installing updates and following usage instructions. Particularly when AI systems are intended to function independently, contracts should explicitly outline user obligations and responsibility restrictions (Adnan et al., 2018). Stakeholders can eliminate uncertainty in liability allocation by defining explicit contractual obligations, guaranteeing that culpability is allocated equitably according to each party's degree of power and influence over the AI system.

The function of Insurance Systems: Creation of AI-Specific Liability Insurance

Because AI-related liability is complicated, creating specific liability insurance for AI systems is a workable way to guarantee that victims are compensated and that stakeholders are shielded from monetary risks. Liability insurance, which covers losses brought on by mistakes or mishaps using AI, can provide a safety net for developers, operators, and users (Marchisio, 2021). Models of insurance for artificial intelligence should be customized to the particular risks connected to various AI applications. For instance, mandatory insurance coverage that covers possible harm from system failures should be required for high-risk AI systems, such as medical diagnostic tools and driverless cars. In order to guarantee that compensation is given regardless of fault, these policies can be set up to cover strict liability claims (Heiss, 2020). Insurance companies can encourage safer AI development by providing incentives for adherence to risk management procedures and safety requirements. For example, lower insurance rates may be available to developers that use stringent testing, transparency policies, and frequent audits. This strategy pushes stakeholders to give safety and accountability top priority when developing AI (Bashayreh et al., 2020).

To further divide risks among many stakeholders, including developers, operators, and outside service providers, pooled insurance plans could be created. By ensuring that no one party is entirely liable, these plans encourage cooperation and shared accountability (Rodrigues, 2020). Conclusively, the creation of liability insurance tailored to AI offers a practical way to handle risks associated with AI, guaranteeing compensation for victims and promoting innovation and responsible AI implementation.

FUTURE OUTLOOK

Future developments in AI liability laws will have a significant impact on how societies strike a balance between accountability, safety, and innovation. Liability frameworks must change to

meet emerging issues and promote the responsible use of AI as these technologies advance. International law harmonization, investment, and innovation will all be significantly impacted by this development.

Perspectives for the Further Development of Liability Regulations

Liability laws will probably change to become more precise and flexible in order to handle the subtleties of AI technologies. The intricacies of self-learning systems and autonomous decision-making will need to be included in the blame liability, strict liability, and product liability legal frameworks already in place. The emergence of hybrid liability models that incorporate aspects of fault-based and strict liability is one potential trend. On the basis of their supervision and intervention, operators and users may be held liable, whereas developers and manufacturers may be strictly liable for high-risk AI applications. By allocating accountability to different stakeholders according to their degree of control and influence over AI systems, regulations may also prioritize proportionate liability models (Bashayreh et al., 2020). A more balanced system might result from this strategy, guaranteeing that consumers, developers, and operators all shoulder the proper amounts of accountability. Adding no-fault compensation plans could also make it easier to compensate victims without requiring drawn-out legal proceedings. In addition to guaranteeing that participants follow verified safety requirements, these programs would provide damages based on the harm inflicted, independent of culpability (Marchisio, 2021). With the development of AI, regulatory sandboxes, which enable developers to test AI systems in safe, regulated settings, may proliferate. By observing AI behaviour in real-world scenarios, these sandboxes give policymakers the opportunity to adjust liability laws (Mecaj, 2022). Iterative techniques like this will aid in the development of legal frameworks that are adaptable and sensitive to new developments in technology.

Potential Impacts on Innovation and Investment in AI

The creation of liability laws will significantly affect AI investment and innovation. More investment in AI technology can be stimulated by clear and predictable liability regulations that give developers, investors, and companies legal confidence. Stakeholders are more inclined to fund the study, creation, and use of AI systems when they are aware of their obligations and possible hazards. However, by raising the costs and legal risks of compliance, too strict laws may impede innovation. Startups and small businesses may be discouraged from entering the AI industry, for instance, if stringent liability is applied to all AI applications, regardless of their level of risk. In order to achieve a balance, authorities must take a risk-based approach, giving low-risk systems greater latitude while placing more stringent regulations on high-risk AI applications (Wendehorst, 2020). Liability restrictions' chilling effects on innovation could be lessened with incentives like government support for AI research and lower insurance rates for developers who comply. Safety, accountability, and innovation must all coexist in a healthy ecosystem which is the goal of public policy. Liability laws can increase public trust by encouraging openness, moral behaviour, and responsible AI practices. This will eventually lead to a greater uptake and investment in AI technology (Gerke, Minssen & Cohen, 2020).

International Harmonization of Legal Standards

Because AI development and use are global in scope, it is imperative that liability laws be standardized across jurisdictions. International trade can be complicated by differences in national legal frameworks, which can also impede cross-border AI applications and produce legal uncertainty. Harmonized standards would guarantee that consumers are equally protected while creating a uniform legal environment that would facilitate international business and development operations. There are already initiatives in place to standardize AI laws. With an

emphasis on risk management, accountability, and openness, the European Union's AI Act establishes a standard for thorough AI regulation. International organizations that have created principles and guidelines for responsible AI development include the OECD and ISO. A framework for managing AI risks is provided by the ISO/IEC 23894:2023 standard, while the OECD AI Principles place a strong emphasis on accountability, transparency, and human rights (Clarke, 2019; Oveisi et al., 2024).

Meaningful harmonization will require cooperation between major economies, including the US, China, and the EU. The regulatory philosophies of these regions differ; the U.S. favours a market-driven strategy, while the EU takes a precautionary approach. According to Zhuk (2023), international cooperation may be facilitated by bridging these disparities through agreements on mutual recognition and common ethical norms. It is also necessary to address issues like cybersecurity, data privacy, and cross-border liability in order to achieve international harmonization. Consistent standards for AI safety can be established with the use of unified regulations, which lowers the possibility of regulatory fragmentation and guarantees that AI systems adhere to the same requirements everywhere. The development of frameworks that are flexible, equitable, and globally consistent is crucial for the future of liability laws pertaining to artificial intelligence. Regulations that tackle the difficulties of self-learning systems, encourage innovation, and promote global collaboration can guarantee that AI keeps developing in a responsible and moral manner.

CONCLUSION

The use of artificial intelligence (AI) in a number of industries has drastically changed how decisions are made, providing greater productivity, creativity, and efficiency. But AI-supported judgments also present difficult legal issues, especially with regard to accountability, transparency, and liability. Key concerns raised by this study include the division of labour in self-learning systems, the ambiguity around third-

party liability, and the challenges associated with tracking AI decisions because of system opacity. These difficulties highlight the pressing need for comprehensive and flexible legal frameworks to handle the rapidly changing landscape of artificial intelligence. These problems have encouraging answers in the suggested methods. The implementation of strict responsibility for high-risk AI applications offers victims a predictable and transparent way to get compensation without having to establish blame. Enhancing traceability and transparency with the required paperwork and explainable AI promotes accountability and increases public confidence.

Contracts and license agreements that clearly define the responsibilities of developers, operators, and users aid in the equitable distribution of blame. The creation of specific liability insurance for AI systems also promotes responsible AI deployment and provides financial security. It is essential for the economy and society to address these liability issues. Because they give developers and companies legal certainty, clear regulations encourage investment and innovation. These frameworks simultaneously reduce the risks connected with AI failures, safeguard customers, and maintain ethical standards. The benefits of AI must be achieved without sacrificing justice, fairness, or public safety as it continues to influence vital industries like healthcare, banking, transportation, and education. This requires striking a balance between scientific innovation and ethical and legal issues. By putting these answers into practice, societies may fully utilize AI while upholding accountability, trust, and fair results.

REFERENCES

- Adnan, N. et al. (2018): How trust can drive forward the user acceptance to the technology? In-vehicle technology for autonomous vehicle, *Transportation Research Part A Policy and Practice*, 118, pp. 819–836.
- Ahmad, S.F. et al. (2023): Impact of artificial intelligence on human loss in decision making, laziness and safety in education,

- Humanities and Social Sciences Communications, 10(1).
- Akpuokwe, C. U., Adeniyi, A. O., & Bakare, S. S. ((2024): legal challenges of artificial intelligence and robotics: a comprehensive review, *Computer Science & IT Research Journal*, 5(3), pp. 544–561.
- Albaroudi, E., Mansouri, T. and Alameer, A. (2024): A comprehensive review of AI techniques for addressing algorithmic bias in job hiring, *AI*, 5(1), pp. 383–404.
- Almaskati, D., Kermanshachi, S. and Pamidimukkala, A. (2024): Investigating the impacts of autonomous vehicles on crash severity and traffic safety, *Frontiers in Built Environment*, 10.
- Amato, A., Osterrieder, J.R. and Machado, M.R. (2024): How can artificial intelligence help customer intelligence for credit portfolio management? A systematic literature review, *International Journal of Information Management Data Insights*, 4(2), p. 100234.
- Andraško, J., Mesarčik, M. and Hamulák, O. (2021): The regulatory intersections between artificial intelligence, data protection and cyber security: challenges and opportunities for the EU legal framework, *AI & Society* [Preprint].
- Babushkina, D. (2022): Are we justified attributing a mistake in diagnosis to an AI diagnostic system?, *I And Ethics*, 3(2), pp. 567–584.
- Baldwin, R. (2019): *The globotics upheaval: Globalisation, robotics and the future of work*. London: Weidenfeld & Nicolson.
- Bashayreh, M., Sibai, F.N. and Tabbara, A. (2020): Artificial intelligence and legal liability: towards an international approach of proportional liability based on risk sharing, *Information & Communications Technology Law*, 30(2), pp. 169–192.
- Bayamlıoğlu, E. (2021): The right to contest automated decisions under the General Data Protection Regulation: Beyond the so-called “right to explanation”, *Regulation & Governance*, 16(4), pp. 1058–1078.
- Benhamou, Y. and Ferland, J. (2020): Artificial intelligence & damages: Assessing liability and calculating the damages, in *Leading Legal Disruption: Artificial Intelligence and a Toolkit for Lawyers and the Law*. Forthcoming.
- Borgesius, F.J.Z. (2020): Strengthening legal protection against discrimination by algorithms and artificial intelligence, *The International Journal of Human Rights*, 24(10), pp. 1572–1593.
- Braun, L.T. et al. (2017): Diagnostic errors by medical students: results of a prospective qualitative study, *BMC Medical Education*, 17(1).
- Brown, M. (2024): Influence of artificial intelligence on credit risk assessment in banking sector, *International Journal of Modern Risk Management*, 2(1), pp. 24–33.
- Buckner, F. (2007): American medical malpractice, in *Elsevier eBooks*, pp. 3–8.
- Buiten, M., De Streel, A. and Peitz, M. (2023): The law and economics of AI liability, *Computer Law & Security Review*, 48, p. 105794.
- Buiten, M.C. (2024): Product liability for defective AI, *European Journal of Law and Economics*, 57(1–2), pp. 239–273.
- Callaghan, N.J. and Callaghan, G. (2024): Legal system: England and Wales Law and courts, in *Elsevier eBooks*, pp. 447–451.
- Chadha, N.K.S. (2024): Bias and Fairness in Artificial intelligence: Methods and Mitigation Strategies, *International Journal for Research Publication and Seminars*, 15(3), pp. 36–49.
- Chen, P., Wu, L. and Wang, L. (2023) AI Fairness in Data Management and Analytics: A review on challenges, Methodologies and

- applications, *Applied Sciences*, 13(18), p. 10258.
- Chen, Z. (2023): Ethics and discrimination in artificial intelligence-enabled recruitment practices, *Humanities and Social Sciences Communications*, 10(1).
- Cheong, B.C. (2024): Transparency and accountability in AI systems: safeguarding wellbeing in the age of algorithmic decision-making, *Frontiers in Human Dynamics*, 6.
- Choung, H., David, P. and Ross, A. (2022): Trust in AI and its role in the acceptance of AI technologies, *International Journal of Human-Computer Interaction*, 39(9), pp. 1727–1739.
- Clarke, R. (2019): Principles and business processes for responsible AI, *Computer Law & Security Review*, 35(4), pp. 410–422.
- Dastin, J. (2018): Insight - Amazon scraps secret AI recruiting tool that showed bias against women, *Reuters*, 11 October. Available at: (Accessed: 5 December 2024).
- De Almeida, P.G.R., Santos, C.D.D. and Farias, J.S. (2021): Artificial Intelligence Regulation: a framework for governance,' *Ethics and Information Technology*, 23(3), pp. 505–525.
- De Graaf, T. and Veldt, G. (2022): The AI Act and its impact on product safety, contracts and liability, *European Review of Private Law/Revue Européenne De Droit Privé/Europäische Zeitschrift Für Privatrecht*, 30(Issue 5), pp. 803–834.
- De Sio, F.S. and Mecacci, G. (2021): Four Responsibility Gaps with Artificial Intelligence: Why they Matter and How to Address them, *Philosophy & Technology*, 34(4), pp. 1057–1084.
- De Zúñiga, H.G., Goyanes, M. and Durotoye, T. (2023): A Scholarly Definition of Artificial Intelligence (AI): Advancing AI as a conceptual framework in communication research, *Political Communication*, 41(2), pp. 317–334.
- DeArman, A. (2019): The wild, Wild West: A case study of self-driving vehicle testing in Arizona, *Arizona Law Review*, 61, p. 983.
- Dirican, C. (2015): The impacts of robotics, artificial intelligence on business and economics, *Procedia - Social and Behavioral Sciences*, 195, pp. 564–573.
- Dundic, P. (2009): Harmonization of rules on product liability in EU member states and the most important provisions of European Product Liability Directive (85/374/EEC), *Zbornik Radova*, 43, p. 457.
- Ebers, M. et al. (2021): The European Commission's Proposal for an Artificial Intelligence Act A Critical Assessment by members of the Robotics and AI Law Society (RAILS), *J Multidisciplinary Scientific Journal*, 4(4), pp. 589–603.
- Ernst, E., Merola, R. and Samaan, D. (2019): Economics of Artificial Intelligence: Implications for the future of work, *IZA Journal of Labor Policy*, 9(1).
- Evangelopoulos, E. (2022): Smart counties: technologies, considerations, characteristics, challenges, policies, and theoretical concerns, in *Elsevier eBooks*, pp. 49–78.
- Evers, C. (2024): Talking past each other? Navigating discourse on ethical AI: Comparing the discourse on ethical AI policy by Big Tech companies and the European Commission, 2022 ACM Conference on Fairness, Accountability, and Transparency, pp. 1885–1896.
- Ferrara, E. (2023): Fairness and Bias in Artificial intelligence: A brief survey of sources, impacts, and mitigation strategies, *Sci*, 6(1), p. 3.
- Friedman, G. D. and McCarthy, T. (2020): Employment law red flags in the use of artificial intelligence in hiring, *Business Law Today*. Available at: https://aiandyou.org/informed/employment/employment_law_red_fl

- ags_in_the_use_of_artificial_intelligence_in_hiring/ (Accessed: 5 December 2024).
- Galvão, L.G. and Huda, M.N. (2023): Pedestrian and vehicle behaviour prediction in autonomous vehicle system A review Expert Systems With Applications, 238, p. 121983.
- Garcia, A.C.B., Garcia, M.G.P. and Rigobon, R. (2023): Algorithmic discrimination in the credit domain: what do we know about it? AI & Society, 39(4), pp. 2059–2098.
- Garikapati, D. and Shetiya, S.S. (2024): Autonomous Vehicles: Evolution of artificial intelligence and the current industry landscape, Big Data and Cognitive Computing, 8(4), p. 42.
- Gautam, A. (2023): The Evaluating the Impact of Artificial Intelligence on Risk Management and Fraud Detection in the Banking Sector, AI, IoT and the Fourth Industrial Revolution Review, 13(11), pp. 9–18. Available at: <https://sciadence.com/index.php/AI-IoT-REVIEW/article/view/25> (Accessed: 8 December 2024).
- Geburczyk, F. (2021): Automated administrative decision-making under the influence of the GDPR Early reflections and upcoming challenges, Computer Law & Security Review, 41, p. 105538.
- Geistfeld, M. A. (2017): A roadmap for autonomous vehicles: State tort liability, automobile insurance, and federal safety regulation, California Law Review, 105, p. 1611.
- Gerke, S., Minssen, T. and Cohen, G. (2020): Ethical and legal challenges of artificial intelligence-driven healthcare, in Elsevier eBooks, pp. 295–336.
- Giannaros, A. et al. (2023): Autonomous vehicles: sophisticated attacks, safety issues, challenges, open topics, blockchain, and future directions, Journal of Cybersecurity and Privacy, 3(3), pp. 493–543.
- Goldman, S. (2023): The potentially large effects of artificial intelligence on economic growth, Economics Research, Available at: <https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.html> (Accessed: 5 December 2024).
- Gonçalves, A.R. et al. (2024): Artificial intelligence vs. autonomous decision-making in streaming platforms: A mixed-method approach, International Journal of Information Management, 76, p. 102748.
- Griffith, M. A. (2023): AI lending and the ECOA: Avoiding accidental discrimination, North Carolina Banking Institute Journal, 27, p. 349.
- Hacker, P., Krestel, R., Grundmann, S. and Naumann, F. (2020): Explainable AI under contract and tort law: legal incentives and technical challenges, Artificial Intelligence and Law, 28, pp. 415–439. Available at: Hay, P. (2015) 'Civil law,' in Elsevier eBooks, pp. 669–673.
- Heiss, S. (2020): Towards optimal liability for artificial intelligence: Lessons from the European Union's proposals of 2020, Hastings Science and Technology Law Journal, 12, p. 186. Available at: https://repository.uclawsf.edu/hastings_science_technology_law_journal/vol12/iss2/4/ (Accessed: 5 December 2024).
- Hernández, E.F., Membrillo, Y.E.N. and Aguilar, R.M.R. (2023b): Importance of artificial intelligence (AI) in the economy, Scientific Journal of Applied Social and Clinical Science, 3(19), pp. 2–11.
- Hevelke, A. and Nida-Rümelin, J. (2014): Responsibility for crashes of Autonomous Vehicles: An Ethical analysis, Science and Engineering Ethics, 21(3), pp. 619–630.
- Horodyski, P. (2023): Applicants perception of artificial intelligence in the recruitment process, Computers in Human Behavior Reports, 11, p. 100303.

- Huang, M.-H., Rust, R. and Maksimovic, V. (2019): The feeling economy: Managing in the next generation of artificial intelligence (AI), *California Management Review*, 61(4), pp. 43–65.
- Iqbal, T. et al. (2024): Towards integration of artificial intelligence into medical devices as a real-time recommender system for personalised healthcare: State-of-the-art and future prospects, *Health Sciences Review*, 10, p. 100150.
- Jani, C. and Rathor, S.P. (2024): A legal framework for determining the criminal liability and punishment for artificial intelligence, *Tuijin Jishu/Journal of Propulsion Technology*, 45(1).
- Kok, J. N., Boers, E. J., Kusters, W. A., Van der Putten, P. and Poel, M. (2009): Artificial intelligence: definition, trends, techniques, and cases, *Artificial Intelligence*, 1(270–299), p. 51.
- Kuzior, A. (2024): Navigating AI regulation: A comparative analysis of EU and US legal frameworks, *Materials Research Proceedings*, 45, pp. 258–266.
- Lai, A. (2021): Artificial intelligence, LLC: Corporate personhood as tort reform, *Michigan State Law Review*, p. 597.
- Machnikowski, P. (2016): European Product Liability: An analysis of the state of the art in the era of new technologies.
- Makridakis, S. (2017): The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms, *Futures*, 90, pp. 46–60.
- Mann, S.P., Cohen, I.G. and Minssen, T. (2024): The EU AI Act: Implications for U.S. health care, *NEJM AI* [Preprint].
- Marchisio, E. (2021): In support of “no-fault” civil liability rules for artificial intelligence, *SN Social Sciences*, 1(2).
- Maroudas, V. P. (2024): Fault-based liability for medical malpractice in the age of artificial intelligence: A comparative analysis of German and Greek medical liability law in view of the challenges posed by AI systems, *Review of European and Comparative Law*, 57, p. 135.
- Mateu, J.-B. and Pluchart, J.-J. (2020): L'économie de l'intelligence artificielle, *Revue D Économie Financière*, N 135(3), pp. 257–272.
- Mecaj, S.E. (2022): Artificial intelligence and legal challenges, *Revista Opinião Jurídica (Fortaleza)*, 20(34), p. 180.
- Montagnani, M.L., Najjar, M.-C. and Davola, A. (2024): The EU Regulatory approach(es) to AI liability, and its Application to the financial services market, *Computer Law & Security Review*, 53, p. 105984.
- Moon, J. and Yoo, H. (2021): Misdiagnosis in occupational and environmental medicine: a scoping review, *Journal of Occupational Medicine and Toxicology*, 16(1).
- Moravec, V., Hynek, N., Gavurova, B., and Kubak, M. (2024): Everyday artificial intelligence unveiled: Societal awareness of technological transformation, *Oeconomia Copernicana*, 15(2), pp. 367–406.
- Murikah, W., Nthenge, J.K. and Musyoka, F.M. (2024): Bias and ethics of AI systems applied in auditing - A systematic review, *Scientific African*, 25, p. e02281.
- Nazer, L.H. et al. (2023): Bias in artificial intelligence algorithms and recommendations for mitigation, *PLOS Digital Health*, 2(6), p. e0000278.
- Neale, G., Hogan, H. and Sevdalis, N. (2011): Misdiagnosis: analysis based on case record review with proposals aimed to improve diagnostic processes, *Clinical Medicine*, 11(4), pp. 317–321.
- Nikolinakos, N.Th. (2024): The European Commission's initial Assessment of the liability Frameworks for Emerging Digital

- Technologies, in *Law, governance and technology series*, pp. 79–127.
- Oveisi, S., gholamrezaie, F., Qajari, N., Moein, M. S., Goodarzi, M. (2024): Review of Artificial Intelligence-Based Systems: Evaluation, Standards, and Methods, *Advances in the Standards & Applied Sciences*, 2(2), pp. 4-29.
- Palladino, N. (2021): The role of epistemic communities in the “constitutionalization” of internet governance: The example of the European Commission High-Level Expert Group on Artificial Intelligence, *Telecommunications Policy*, 45(6), p. 102149.
- Pellicelli, M. (2023): Managing the supply chain, in Elsevier eBooks, pp. 101–152.
- Polemi, N.et al. (2024): Challenges and efforts in managing AI trustworthiness risks: a state of knowledge, *Frontiers in Big Data*, 7.
- Rathore, S.P.S. (2023): The Impact of AI on Recruitment and Selection Processes: Analysing the role of AI in automating and enhancing recruitment and selection procedures, *International Journal for Global Academic & Scientific Research*, 2(2), pp. 78–93.
- Riehm, T. and Meier, S. (2019): Product liability in Germany, *Journal of European Consumer and Market Law*, 8, p. 161.
- Rodrigues, R. (2020): Legal and human rights issues of AI: Gaps, challenges and vulnerabilities, *Journal of Responsible Technology*, 4, p. 100005.
- Rodriguez, V. (2023): Ethical implications of AI-based algorithms in recruiting processes: A study of civil rights violations under Title VII and the Americans with Disabilities Act, *Cyber Operations and Resilience Program Graduate Projects*, 7.
- Roig, A. (2017): Safeguards for the right not to be subject to a decision based solely on automated processing (Article 22 GDPR), *European Journal of Law and Technology*, 8(3).
- Sadok, H., Sakka, F. and Maknouzi, M.E.H.E. (2022): Artificial intelligence and bank credit analysis: A review, *Cogent Economics & Finance*, 10(1).
- Schuster, F. P. (2009): Main structures of product liability in German private and criminal law, *Stellenbosch Law Review*, 20(3), pp. 426–453.
- Scott, R. (2009) Legal foundations, in Elsevier eBooks, pp. 2–23.
- Sever, T. and Contissa, G. (2024) Automated driving regulations where are we now? *Transportation Research Interdisciplinary Perspectives*, 24, p. 101033.
- Trabelsi, M.A. (2024): The impact of artificial intelligence on economic development, *Journal of Electronic Business & Digital Economics*, 3(2), pp. 142–155.
- Truli, E. (2018): The general Data Protection Regulation and civil liability, in *MPI studies on intellectual property and competition law*, pp. 303–329.
- Tsamados, A., Floridi, L. and Taddeo, M. (2024): Human control of AI systems: from supervision to teaming, *AI and Ethics* [Preprint].
- Uzair, M. (2021): Who is liable when a driverless car crashes?, *World Electric Vehicle Journal*, 12(2), p. 62.
- Van Alsenoy, B. (2016): Liability under EU data protection law: From Directive 95/46 to the General Data Protection Regulation, *Journal of Intellectual Property, Information Technology and Electronic Commerce Law*, 7, p. 271.
- Van Gool, E. (2024): Overview of German product liability Law, *SSRN Electronic Journal* [Preprint].
- Varsha, P. S. (2023): How can we manage biases in artificial intelligence systems A systematic

literature review, *International Journal of Information Management Data Insights*, 3(1), p. 100165.

Von Bodungen, B. and Steege, H. (2024): Liability for automated and autonomous driving in Germany, in *Data science, machine intelligence, and law*, pp. 279–320.

Wendehorst, C. (2020): Strict Liability for AI and other Emerging Technologies, *Journal of European Tort Law*, 11(2), pp. 150–180.

White, F. (2017): Directive 85/374/EEC concerning liability for defective products: in the name of harmonisation, the internal market and consumer protection, in Edward Elgar Publishing eBooks.

Wuyts, D. (2014): The Product Liability Directive More than two Decades of Defective Products in Europe, *Journal of European Tort Law*, 5(1), pp. 1–34.

Zech, H. (2021): Liability for AI: public policy considerations, *ERA Forum*, 22(1), pp. 147–158.

Zhang, X. (2024): Legal challenges and responses to Artificial Intelligence-Assisted Decision-Making in the International Economic Law system, *Applied Mathematics and Nonlinear Sciences*, 9(1).

Zhang, Y. et al. (2023): Perception and sensing for autonomous vehicles under adverse weather conditions: A survey, *ISPRS Journal of Photogrammetry and Remote Sensing*, 196, pp. 146–177.

Zhuk, A. (2023): Navigating the legal landscape of AI copyright: a comparative analysis of EU, US, and Chinese approaches, *AI and Ethics*, 4(4), pp. 1299–1306.