KMANPUB | AI and Tech in Behavioral and Social Sciences Vol. 3 No. 3 (2025): 1-9

Article history:
Received 22 November 2024
Revised 19 December 2024
Accepted 28 January 2024
Published online 01 July 2025

# Legal and Comparative Analysis of Civil Liability of Artificial Intelligence in Automated Decision-Making

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A r t i c l e  I n f o

**Article type:**
*Review Article*

**How to cite this article:**
Farajpour, R. (2025). Legal and Comparative Analysis of Civil Liability of Artificial Intelligence in Automated Decision-Making. *AI and Tech in Behavioral and Social Sciences, 3*(3), 1-9. https://doi.org/10.61838/kman.aitech.3.3.4



A B S T R A C T

With the rapid advancement of human-centric artificial intelligence, this technology has become a significant factor influencing various fields, including medicine, industry, transportation, commerce, law, and banking. Machine-based artificial intelligence, through automated decision-making, has taken over tasks that were previously performed by humans. However, a fundamental challenge in this area is determining legal liability in cases where AI systems make errors. The significance of this issue lies in the fact that, in many countries, traditional civil liability laws are primarily based on human will and actions, and a comprehensive legal framework for artificial intelligence and automated decision-making has yet to be developed. This paper examines the theoretical foundations of civil liability in automated decision-making and the emerging challenges in this domain. This study employs an analytical-descriptive and comparative legal research method. Different legal systems have adopted varying approaches to determining AI civil liability. In the United States, liability is primarily assessed under product liability and vicarious liability doctrines, whereas the European Union is moving towards a strict liability model and AI civil liability insurance. In Iran, civil liability remains based on human and corporate legal personality, and AI lacks independent legal personality. Some legal systems, such as Germany, have proposed that AI-based decision-making should be subject to a corporate liability model. This paper analyzes various models for determining AI civil liability, including developer and manufacturer liability, operator liability, strict liability, civil liability insurance, and the possibility of granting AI limited legal personality. The strict liability model, which is gaining traction in the European Union, holds organizations accountable for AI-related damages, regardless of fault. In Iran, the absence of specific regulations in this area may lead to significant legal ambiguities and enforcement challenges in AI-related lawsuits. Finally, this paper emphasizes the necessity of drafting new legal regulations aligned with international standards to effectively address the legal challenges and civil liability issues arising from AI-driven automated decision-making.

***Keywords:*** *Artificial Intelligence, Civil Liability, Automated Decision-Making, Strict Liability, Legal Personality of AI, AI Rules.*

## 1. Introduction

With the rapid growth of human-centric artificial intelligence, this technology has significantly impacted various aspects of human life (Santoso, 2024; Suryana, 2024). Today, artificial intelligence plays a crucial role in fields such as medicine, industry, transportation, commerce, law, and banking. From patient health prediction systems to automated loan processing and self-driving systems, AI-based machine decision-making has taken over tasks that were previously carried out by humans (Arianto, 2024; Xudaybergenov, 2023). One of the key features of machine-based artificial intelligence is its automated decision-making capability. This type of decision-making involves making choices without direct human intervention, which brings both advantages and challenges (Jiang, 2023; Nguyen & Quan, 2023). On the one hand, higher processing speed, greater accuracy, and the elimination of human biases are among its benefits. On the other hand, when an artificial intelligence system makes an error, determining legal liability becomes problematic (Barron, 2022; Zak et al., 2020). For instance, if a self-driving vehicle causes an accident due to a failure in its path recognition system, who should be held liable for the damages? Should the vehicle owner, software developer, hardware manufacturer, or the regulatory body overseeing this technology be held accountable? Similarly, if an AI system in the medical field provides an incorrect diagnosis leading to inappropriate treatment or the patient's death, how can the causal relationship between the system's error and the damage suffered be legally established? The importance of this issue lies in the fact that, in many countries, traditional civil liability laws are primarily based on human will and actions, and a comprehensive legal framework for artificial intelligence and automated decision-making has yet to be fully developed. Therefore, a comparative analysis of different legal systems—including Iran, the European Union, and the United States—can help clarify these challenges and propose appropriate legal solutions.

## 2. Methodology

This study employs an analytical-descriptive and comparative legal research method. The analytical-descriptive approach is used to examine the laws and regulations related to the civil liability of artificial intelligence, analyzing legal data and scholarly theories to explore relevant concepts and challenges. In this regard, credible sources, including domestic laws, international regulations, academic articles, and legal books, have been utilized. Additionally, this research adopts a comparative legal approach by analyzing different legal systems, including those of the United States, the European Union, and Iran, to identify the strengths and weaknesses of existing legal frameworks governing AI civil liability. This approach enables the formulation of legal recommendations tailored to Iran. The study evaluates various liability models, such as fault-based liability, strict liability, and innovative models like hybrid liability and AI liability insurance. The data collection process follows a library-based method, sourcing information from research papers, legal books, European Union reports, and relevant court cases. Data analysis is conducted using a qualitative approach, interpreting legal concepts and regulations within a legal framework. Ultimately, this research aims to integrate comparative studies and legal analysis to propose a framework for determining AI civil liability in Iran that aligns with international standards while addressing domestic legal needs.

## 3. Theoretical Foundations of Civil Liability in Automated Decision-Making

In traditional legal systems, civil liability is based on the relationship between causation, fault, and compensation (Katouzian, 2011). This concept is meaningful when a human or organizational entity can be held accountable for its actions and decisions. However, the emergence of artificial intelligence and automated decision-making systems has introduced new challenges in this area, as these systems make decisions without direct human intervention, relying on machine learning algorithms and neural networks (Boden, 2016). The fundamental question is: who should be held liable for damages resulting from automated decision-making? In Iranian law, civil liability is primarily based on the principle of fault. According to Article 1 of the Iranian Civil Liability Act (1960), any person who causes damage to another without legal authorization is responsible for compensating the harm. This provision clearly necessitates human agency in establishing civil liability.Therefore, attributing liability to artificial intelligence systems which lack independent will and legal personality poses significant challenges (Safayi, 2021). For example, if an AI-based medical diagnosis system incorrectly diagnoses an illness, leading to a patient's death, liability would be attributed to the doctor, hospital, or software developer, as the AI system itself does not have


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E-ISSN: 3041-9433

independent legal personality. Comparative Legal Perspectives In comparative law, some jurisdictions have attempted to address the civil liability of automated decision-making systems within new legal frameworks.

### *3.1. United States*

In the U.S. legal system, certain judicial precedents recognize the liability of AI developers and manufacturers. For instance, in the 2018 Uber self-driving car accident, which resulted in the death of a pedestrian, the court held Uber liable, reasoning that although the vehicle's decision-making was fully automated, the company had a duty to ensure adequate oversight of its autonomous system (Safayi, 2021). This case illustrates that even when an AI system makes decisions independently, legal responsibility ultimately falls on a human or corporate entity associated with it.

### *3.2. European Union*

In the European Union, some legal scholars and policymakers have proposed the strict liability model for AI-related damages. The draft AI Act (2021) suggests that any organization or company utilizing automated decision-making systems should be liable for all resulting damages, even in the absence of fault (European Parliament, 2020). A notable case in Germany involved an insurance company that used AI algorithms to determine insurance premiums. The court ruled that the company was responsible for discriminatory pricing, even though the decisions were entirely made by AI (Sartor & Lagioia, 2020). This case highlights a shift towards strict liability in scenarios where AI-driven decisions impact fundamental rights and consumer protections.

One of the major challenges in civil liability for automated decision-making is establishing a causal link between an AI system's decision and the resulting damage. Under Article 328 of the Iranian Civil Code, any person who causes the destruction of another's property is liable, even if they did not directly contribute to the harm. However, in the case of artificial intelligence, how can it be proven that a machine learning system was directly responsible for a particular loss? A significant obstacle in this regard is the Black Box Theory, which states that the decision-making processes in deep learning-based systems are so complex that even their developers cannot fully explain why a specific decision was made (Gangloff, 2021). This issue has made it extremely difficult in some legal cases to establish a clear causal link between AI-driven decisions and damages. In some countries, such as Germany and France, it has been proposed that a civil liability insurance fund for artificial intelligence be established to compensate for damages resulting from automated decision-making without requiring a precise determination of liability (Bryson et al., 2017). This model is similar to mandatory civil liability insurance for vehicles, where in the event of an accident, the insurance company compensates the victim without requiring a detailed determination of fault. Ultimately, an examination of the theoretical foundations of civil liability in automated decision-making reveals that traditional legal models are insufficient to address these challenges and require modification or expansion. Some proposed solutions include holding AI developers and operators accountable, applying strict liability principles, implementing insurance-based compensation models, and even exploring the possibility of granting limited legal personality to AI systems in specific cases (Sartor & Lagioia, 2020). In Iranian law, it is recommended that new regulations be introduced to govern the liability of automated decision-making systems, particularly in high-risk industries such as medicine, transportation, and finance, where dependence on artificial intelligence is growing rapidly.

### *3.3. Human, Organizational, and Machine-Based Agency*

Human agency is based on will, discretion, and responsibility and, in traditional legal systems, is exclusively attributed to natural or legal persons (Katouzian, 2011; Mahdavi, 2022). With the emergence of artificial intelligence (AI) and automated decision-making, questions have arisen regarding the extent to which human agency can be maintained in AI decision-making processes. In Iranian law, existing regulations continue to emphasize human responsibility. For instance, Article 1 of the Iranian Civil Liability Act (1960) explicitly states that civil liability applies to humans and does not mention autonomous technologies. Similarly, Article 328 of the Iranian Civil Code (1928) places responsibility for damages on human agents. In cases where an AI system makes an error, responsibility lies with developers, operators, or users. In a relevant case in the United States, a court ruled that a trading robot was merely a tool and that final decision-making rested with the developing company (Bryson et al., 2017). In the European Union, it has been proposed that when AI makes independent decisions causing harm,



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special insurance funds should be established for compensation (Sartor & Lagioia, 2020). However, this proposal has yet to receive formal approval. A notable example of these challenges was the 2018 Uber self-driving car incident, where the court held Uber liable as the operator of the technology (Goodman & Flaxman, 2019). Corporate agency refers to the ability of legal entities such as companies and institutions to assume responsibility (French, 1984). In Iranian law, Article 583 of the Iranian Commercial Code (1932) recognizes corporations as having independent legal personality, making them accountable for their commitments. Similarly, Article 1 of the Iranian Civil Liability Act (1960) holds legal persons liable for damages. Consequently, in cases where AI causes harm, the responsibility falls on the corporate entity using it (Katouzian, 2011). In a U.S. case, a bank employed an AI-driven trading system, but errors in the algorithm resulted in financial losses. The court ruled that the bank, not the AI system, was responsible for compensating the damages (Goldberg et al., 2021). In the EU, the draft AI Act (2021) mandates that companies using AI for decision-making must assume full legal responsibility (Sartor & Lagioia, 2020). Another case involved a German insurance company accused of discriminatory insurance rate calculations based on AI algorithms. The court held the company accountable, rejecting its defense that the algorithm made the decision independently (European Parliament, 2020). Similarly, in Tesla's 2019 self-driving car accident, which resulted in a fatal crash, the court ruled that Tesla was responsible for the defective design of the autonomous system (Goodman & Flaxman, 2019).

In traditional legal frameworks, AI does not possess independent agency, and all legal responsibility remains with developers, users, or corporate entities operating the technology. While new legal frameworks may emerge as AI adoption expands, current legal systems worldwide continue to attribute accountability to human entities rather than AI itself.

### *3.4. The Possibility of Granting Limited Legal Personality to Artificial Intelligence*

One of the fundamental challenges in various legal systems is the possibility of recognizing independent legal personality for artificial intelligence. In traditional law, legal personality is divided into two main categories: natural legal personality (humans) and corporate legal personality (such as companies and public institutions) (Katouzian, 2011). Legal personality allows an entity to enter into contracts, own property, and bear legal or criminal liability (French, 1984). However, with the emergence of artificial intelligence and automated decision-making systems, the question arises whether AI can be granted independent legal personality. In Iranian law, legal personality is exclusively granted to humans and legally registered entities. According to Article 583 of the Iranian Commercial Code, commercial companies possess independent legal personality separate from their shareholders and managers, allowing them to hold rights and obligations independently ("Iranian Commercial Code: Article 583," 1932). Furthermore, Article 1 of the Iranian Civil Liability Act (1960) states that natural and legal persons are responsible for compensating damages caused by their actions. Thus, AI lacks legal personality under Iranian law, and any decision it makes must be attributed to a natural or legal person. For instance, if an AI-driven medical system in a hospital misdiagnoses a patient, leading to their death, legal responsibility falls on the doctor, hospital, or software developer, as AI itself does not constitute an independent entity (Safayi, 2021). In comparative law, some countries have proposed granting AI a limited form of legal personality. The EU AI Act (2021) draft regulations propose that in cases where AI systems operate independently and cause damage, a legal framework should be established to regulate their liability (Sartor & Lagioia, 2020). This proposal considers the creation of insurance funds to compensate for damages caused by AI decisions, but formal recognition of AI's independent legal personality has not yet been legislated. A significant case in this context was the 2019 Tesla self-driving car accident. In this incident, a Tesla vehicle using an AI algorithm for autonomous driving erroneously accelerated at an intersection, resulting in a fatal crash. The victim's family argued that Tesla should be absolved of liability since the decision was made entirely autonomously with no human intervention. However, the court ruled that AI lacks independent legal personality and cannot be held accountable, placing liability on Tesla as the manufacturer (Goodman & Flaxman, 2019). This case demonstrated that even when an AI system makes an independent decision, liability still falls on its developer or operator. In U.S. law, discussions regarding recognizing AI legal personality have emerged in multiple cases. One significant example is the SEC v. Knight Capital (2012) case, in which an AI trading bot autonomously executed stock market transactions, triggering a sudden market crash. Knight Capital argued that the erroneous decisions were made by the algorithm


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E-ISSN: 3041-9433

and that the company should not be held responsible. However, the court ruled that AI lacks independent legal personality and, therefore, the company was liable for all damages resulting from the AI's decisions (Goldberg et al., 2021). In Germany, some legal scholars have proposed adopting a model similar to corporate legal personality for AI. Under this model, AI systems would be granted limited legal personality but would still remain under human supervision and control (Bryson et al., 2017). This model resembles the concept of corporate legal personality, where companies possess rights and obligations independent of their shareholders. However, critics argue that, unlike corporations, AI lacks intent, autonomy, and accountability, making the legal recognition of AI personality unjustifiable (Boden, 2016). In Iranian law, the current legal framework does not allow for the recognition of independent legal personality for AI. According to legal principles, legal personality is granted only to humans or legally registered entities, and AI is regarded as a tool rather than an autonomous agent (Katouzian, 2011). For instance, if an AI-powered financial analysis software leads a customer to suffer stock market losses, legal responsibility would fall on the software developer or the organization utilizing it, rather than the AI system itself.

Based on these analyses, no traditional legal system has recognized AI as an independent legal entity. Although some proposals suggest designing a corporate-like legal model for AI, significant challenges remain, including the lack of intent, autonomy, and accountability in AI systems. Therefore, at present, responsibility for all AI decisions remains with humans and the organizations that develop or utilize AI technologies.

## 4. Comparative Analysis of Civil Liability of Artificial Intelligence in Different Legal Systems

Civil liability in different legal systems is based on principles such as fault, causation, and compensation (Katouzian, 2011). With the emergence of artificial intelligence (AI) and automated decision-making systems, many of these traditional principles face challenges, as AI lacks human will and autonomy and cannot be recognized as an independently responsible entity (Boden, 2016). This issue has led to various approaches to AI liability across legal systems. Some countries, such as Iran and the United States, continue to emphasize the direct liability of AI operators and developers, while in other jurisdictions, such as the European Union, concepts like strict liability and limited legal personality for AI have been proposed (Sartor & Lagioia, 2020). In Iranian law, civil liability remains based on human and corporate legal personality. Article 1 of the Iranian Civil Liability Act (1960) states that any individual who unlawfully causes damage must compensate for it. Based on this, if an AI system makes an error, liability falls on its operator or developer. For instance, if an AI-based medical diagnosis software incorrectly diagnoses a disease, leading to a patient's death, the hospital or the software developer would be held accountable (Safayi, 2021). Moreover, Article 328 of the Iranian Civil Code (1928) establishes that anyone who causes harm, even without fault, is liable for compensation, which could be applied to automated decision-making systems (Civil Code, 1928). In the United States, AI liability is primarily assessed under the product liability and vicarious liability doctrines (Goodman & Flaxman, 2019). The U.S. legal system holds AI manufacturers and developers accountable for ensuring the safety and accuracy of their products. For example, in the 2018 Uber self-driving car case, where an autonomous vehicle struck and killed a pedestrian in Arizona, the court held Uber responsible, ruling that its self-driving system failed to properly analyze environmental conditions (Bryson et al., 2017). This case demonstrates that, in the U.S., AI-related liability remains attributed to human or corporate entities, rather than the AI system itself. In the European Union, efforts have been made to develop a comprehensive legal framework for AI liability. The EU AI Act (2021) draft regulations propose a strict liability model for certain advanced AI systems, meaning that organizations utilizing AI must compensate for damages caused by it, regardless of fault (Sartor & Lagioia, 2020). Additionally, some EU proposals suggest that AI could be granted a limited form of legal personality, allowing it to be subject to lawsuits and financial liability (European Parliament, 2020). In Germany, courts have applied the corporate liability approach to AI decision-making. In a case involving a German insurance company, where an AI system was used to determine insurance rates, it was found that the algorithm unfairly increased premiums for elderly individuals. The court ruled that the company could not claim AI as the responsible party and that it must accept full liability for its AI-driven decisions (Goodman & Flaxman, 2019). This case illustrates that in Germany, responsibility for AI decisions remains with human institutions.

In China, the government has implemented strict policies to regulate AI liability due to the rapid


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advancement of AI technologies. Under Chinese regulations, companies employing AI-driven decision-making systems bear full responsibility for any resulting harm. In 2019, a Chinese tech company was fined for using machine learning algorithms to process user data, violating privacy laws and causing financial harm to users (Zhang, 2020). This case demonstrates that in China, civil liability for AI remains entirely with developers and operators, rather than the AI system itself. Based on a comparative analysis of AI civil liability in different legal systems, no jurisdiction has yet recognized AI as an independent legal entity. However, some countries, such as the EU and Germany, are exploring models like strict liability or limited legal personality for AI. In contrast, Iran, the U.S., and China continue to emphasize the liability of AI developers, operators, and related organizations. Thus, legal approaches to AI liability are still evolving and vary based on the cultural, economic, and legal contexts of each country.

## 5. Proposed Models for Determining Civil Liability of Artificial Intelligence

With the increasing use of artificial intelligence (AI) and automated decision-making systems, the challenges related to civil liability arising from AI-driven decisions have become a key legal issue. Since AI lacks human will and autonomy and cannot be recognized as an independent liable entity, it is essential to establish a legal framework for its civil liability (Boden, 2016). In this regard, several legal models have been proposed, including liability of developers and manufacturers, operator liability, strict liability, civil liability insurance, and the possibility of granting limited legal personality to AI (Sartor & Lagioia, 2020). These models have been discussed in Iranian and international legal systems in different ways.

In Iranian law, civil liability is primarily based on fault and causation (Katouzian, 2011). Article 1 of the Iranian Civil Liability Act (1960) states that any natural or legal person who causes damage to another is responsible for compensating it. This implies that any erroneous decision made by AI must be attributed to a human entity. Accordingly, one of the most common models in Iran for determining AI civil liability is the attribution of liability to AI developers and manufacturers. For example, if an AI-based medical software misdiagnoses a disease, leading to a patient's death, the hospital or the software developer would be liable (Safayi, 2021). In the United States, one of the proposed models is the product liability system, which holds manufacturers and designers of AI systems responsible. For instance, in the 2018 Uber self-driving car case, the court ruled that Uber was responsible for the failure of its autonomous driving system, as the AI independently decided not to stop, resulting in a pedestrian's death (Goodman & Flaxman, 2019). This case demonstrates that in U.S. law, liability for AI decisions is attributed to the companies producing AI, rather than AI itself. In the European Union, the strict liability model has been proposed for certain high-risk AI systems (European Parliament, 2020). The EU AI Act (2021) draft regulations suggest that any organization using AI in decision-making processes must be responsible for all damages caused by it, even in the absence of fault (Sartor & Lagioia, 2020). This model was applied in a German case, where an insurance company using AI to determine insurance premiums was found to have discriminated against elderly policyholders. The court ruled that the company could not claim that the decision was made by the algorithm and that it bore no responsibility. Instead, under the strict liability principle, the company was required to compensate for the damages (Goodman & Flaxman, 2019). Another proposed model in legal systems is civil liability insurance for AI. Under this model, it is suggested that AI systems should be covered by specific insurance policies, ensuring that in the event of damage, the insurance company compensates the victims (Bryson et al., 2017). For instance, in the SEC v. Knight Capital (2012) case, an AI trading algorithm executed erroneous stock market transactions, causing a sudden market crash. The court ruled that Knight Capital was responsible for all financial losses, but if AI liability insurance had existed, the company could have mitigated the financial burden (Goldberg et al., 2021). Another discussed model in the EU is the possibility of granting limited legal personality to AI. This model proposes that some AI systems capable of independent decision-making be registered as legal entities with specified financial liability (European Parliament, 2020). This concept has been debated in Germany, where scholars have suggested that if this model is adopted, AI systems could compensate for damages through designated financial funds (Schwab, 2023). However, this idea faces numerous legal and ethical challenges, as AI lacks human intent, will, and accountability, making it infeasible to prosecute AI as an individual or corporation (Boden, 2016). In Iranian law, none of these proposed models have been officially implemented, but attributing liability to AI developers and operators remains the dominant approach (Katouzian,


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2011). For example, if an AI system in banking wrongly denies a customer's loan application, causing financial harm, the bank or software developer would be liable. This issue has been observed in various Iranian legal cases, particularly concerning AI-driven identity verification algorithms, which have led to unjust decisions (Safayi, 2021). As a result, different legal systems have adopted varying approaches to AI civil liability. Some countries, such as Iran and the United States, emphasize the liability of AI developers and operators, while some European jurisdictions propose strict liability or AI liability insurance. However, no country has yet officially recognized AI as an independent legal entity. In the future, a hybrid model combining these approaches may be adopted to balance technological advancement with legal protection for affected individuals.

## 6. Conclusion

The analysis conducted in this study demonstrates that traditional legal systems, which are based on human agency, fault, and causation, are insufficient to regulate the civil liability of artificial intelligence in automated decision-making. As AI systems operate with increasing autonomy, they pose significant challenges to legal frameworks worldwide. In Iranian law, Article 1 of the Civil Liability Act (1960) assigns liability for damages to natural and legal persons; however, the lack of independent will and intent in AI necessitates a reconsideration of liability allocation among developers, operators, and users. Comparative legal studies indicate that some jurisdictions, such as the European Union, have adopted strict liability and AI liability insurance models, while the United States primarily holds developers and operators accountable. In Iran, the absence of a clear legal framework creates significant legal and enforcement ambiguities, potentially leading to judicial uncertainty in AI-related cases. Given the rapid advancement of machine-based artificial intelligence and the increasing use of automated decision-making, it is crucial for Iran's legal system to undergo comprehensive reforms to address emerging challenges. The following key proposals are suggested:

1-Establishing a Dedicated Legal Framework for AI Civil Liability:

Current Iranian civil liability laws are rooted in traditional legal models that are not suited for autonomous technologies. Legislators should develop a specialized legal framework for AI liability, which clearly defines liability rules across critical sectors such as healthcare, finance, transportation, and other AI-driven industries.

2-Implementing a Strict Liability Model for High-Risk AI Systems:

In high-risk domains, such as autonomous vehicles, medical AI systems, and cybersecurity AI, it is recommended that a strict liability model be implemented. Under this framework, AI developers and operators would be held liable for damages without requiring proof of fault, ensuring swift compensation for victims and enhancing public trust in AI technologies, similar to the approach adopted by the European Union.

3-Introducing AI Civil Liability Insurance:

One of the most effective solutions to address AI-related liability issues is the introduction of an AI liability insurance system. In countries like Germany, AI developers are mandated to obtain liability insurance to cover potential damages caused by AI-driven decisions. Adopting a similar insurance model in Iran would protect victims' rights while fostering responsible AI innovation.

4-Establishing an Independent AI Oversight Authority:

A dedicated regulatory authority should be established to monitor and assess AI decision-making processes, particularly in industries directly affecting human lives (such as healthcare, finance, and transportation). This authority should enforce transparency, set compliance standards, and take remedial actions in case of violations.

5-Exploring the Possibility of Limited Legal Personhood for AI:

As AI systems become increasingly autonomous, some legal scholars propose granting limited legal personhood to AI, similar to corporate legal entities. While no jurisdiction has officially recognized AI as a legal person, this concept could be tested in specific areas, such as smart contracts and automated financial transactions. However, such an approach must be carefully examined for its ethical and legal implications.

6-Establishing AI-Specific Courts:

Since many judges and legal practitioners lack technical expertise in machine learning algorithms and AI decision-making, the creation of specialized AI courts is recommended. These courts should include technology and legal experts to ensure accurate and efficient adjudication of AI-related disputes. Such a system would enhance judicial precision and public confidence in the legal system's ability to address AI challenges.

7-Enforcing AI Decision Transparency Regulations:



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AI algorithms are increasingly used in bank loan approvals, hiring decisions, and criminal justice assessments, yet the reasoning behind their decisions often remains opaque. It is recommended that companies be legally required to disclose how AI decisions are made and provide users with a right to explanation, ensuring fairness and preventing algorithmic discrimination.

8-Aligning Iran's AI Regulations with International Standards:

Since AI-driven legal and commercial interactions transcend national borders, harmonizing Iranian AI laws with global legal standards can reduce legal conflicts, attract foreign investment, and create a robust legal infrastructure for AI development. Iran should consider joining international AI liability conventions to enhance its regulatory landscape.

The findings of this study confirm that traditional legal frameworks alone are inadequate to regulate AI civil liability and must be reformed. Some jurisdictions, such as the United States, hold developers and operators responsible, whereas the European Union is moving towards strict liability and AI liability insurance. In Iran, the absence of AI-specific legislation may lead to significant legal challenges, potentially hindering the sustainable development of AI technologies. To address these issues, it is recommended that Iran develop a dedicated AI civil liability framework, implement strict liability for high-risk AI, introduce AI liability insurance, and establish specialized courts for AI disputes. Additionally, Iran should align its regulations with international standards to ensure legal clarity, foster AI innovation, and protect the rights of affected individuals. By implementing these proposals, Iran's legal system can achieve a balance between technological advancement and legal accountability, ensuring a responsible and ethical AI ecosystem. The Hybrid AI Liability Model is a proposed framework for regulating the civil liability of artificial intelligence in Iran, designed based on the level of AI autonomy, AI liability insurance, and the possibility of granting limited legal personality. This model classifies liability into three levels: In the first level, where AI functions merely as a decision-making tool, liability falls on the user or operator. In the second level, where AI is semi-autonomous, liability is shared between the developer, operator, and insurance. In the third level, where AI operates fully autonomously, absolute liability is assigned to the developer, and damages are compensated through AI liability insurance.To implement this model, it is proposed that purchasing AI liability insurance be mandatory to ensure compensation for damages without the need to precisely determine fault. Additionally, in specific cases, AI should be granted limited legal personality to assume responsibility for certain decisions. Establishing an independent regulatory body to oversee and regulate AI performance is also essential. Implementing this model in Iran can help reduce legal uncertainties, enhance transparency in liability allocation, and strengthen the legal framework for AI development.

## Authors' Contributions

Not applicable.

## Declaration

In order to correct and improve the academic writing of our paper, I have used the language model ChatGPT.

## Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

## Acknowledgments

I wish to express my sincere gratitude to Dr. David J. Gunkel for his invaluable insights, critical feedback, and scholarly guidance that significantly contributed to the conceptual and philosophical depth of this study. His pioneering work on the ethics of technology and communication provided an essential foundation for the development of this research.

## Declaration of Interest

The author reports no conflict of interest.

## Funding

According to the authors, this article has no financial support.

## Ethics Considerations

Ethical concerns were addressed by ensuring transparency in the selection and analysis of sources. Proper citations were maintained throughout the review to credit original authors and avoid plagiarism. Additionally, care was taken to evaluate the potential biases inherent in



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E-ISSN: 3041-9433

the reviewed materials, particularly when analyzing industry reports or whitepapers that may have vested interests.

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AITBSS AI and Tech in Behavioral and Social Sciences
E-ISSN: 3041-9433