American Journal of
Law
(AJL)

Criminal Liability about the Use of Artificial Intelligence: Investigating the Actus Reus Element of AI-driven Technology

Alaa Saud

American Journal of Law
ISSN 2709-6521 (Online)
Vol.6, Issue 1, pp 1 - 25, 2023

www.ajpojournals.org

Criminal Liability about the Use of Artificial Intelligence: Investigating the Actus Reus Element of AI-driven Technology

Alaa Saud[1*]
[1]Lecturer, Aljouf University
Country: Kingdom of Saudi Arabia (KSA)
CorContact Information: alaasaud95@gmail.com

Article history
Submitted 06.12.2023 Revised Version Received 22.12.2023 Accepted 02.01.2023

Abstract

Purpose: This paper aimed to determine the liability for criminal activities committed by AI-enabled machines and explore defences that could invalidate their criminal liability. It also analysed the Actus Reus element, to identify which actors are involved in the criminal act.

Materials and Methods: A systematic review of existing research on AI liability in crime was conducted, focusing on 30 articles related to the study.

Findings: The study found that if certain conditions are met, any individual, company, or legal organisation can be held legally liable for illegal activities. As AI technology advances, current legal remedies are needed to protect society from the hazards it poses. Existing criminal law offers various approaches to dealing with AI liability, but the liability concerns generated by AI systems extend beyond traditional criminal law. Recognising robots as legal persons has been criticised as an overly complex solution.

Implications to Theory, Practice and Policy: The study emphasises that the responsibility for monitoring and managing AI and its operations begins from the moment it is employed or deployed. Criminal law and the criminalisation of behaviour only address the question of responsibility to a limited extent, and the responsibility for monitoring should be viewed as an obligation towards the law.

Keywords: *Liability, Criminal Activities, Actus, Reus, AI liability, Robots, Criminal Act*

1.0 INTRODUCTION

The purpose of criminal law is to ensure the elimination of harm, and a crucial aspect of this goal is to convey the immorality and culpability of the behaviours that are considered illegal. Criminal law provides certain moral directions, and adhering to those directions requires that potential offenders must be morally held accountable.[1]. They should also be discouraged by the fear that the possibility exists of being punished for their actions. Efforts made by tech giants to create an artificial being characterised by super intelligence pose a significant challenge to existing criminal law based on the consideration of human control. Human control provides the foundation for determining whether or not a person can be attributed with criminal liability in a given scenario.[2]. Artificial Intelligence has become popular with complementing the tasks of humans in every domain of life, such as with the use of digital assistants, industrial robotics and unmanned vehicles.[3]. However, problems arise due to the limited control of humans over AI in the face of enhanced autonomy of AI-enabled machines, especially while investigating liabilities associated with the guilty act.[4]. When an AI acts on its own, the human's limited control over the AI appears problematic even before the guilty conduct of the crime is examined. It is noteworthy that the qualities of AI contradict the requirements for determining the responsibility of crime.

Criminal activities are referred to as any action (or omission) which constitutes a violation punishable by criminal law without limiting the applicability of the definition to other countries that similarly describe criminality.[5]. AI-enabled crime can be defined as the misuse of the learning skills and autonomy that are characteristic of AI-enabled machines or systems for criminal purposes. The major issue in implementing AI in the industry is to determine and penalise the actual culprit in cases where autonomous machines cause harm to users.[6]. It is difficult for the law to prevent the growth of AI due to its significance and demand in each sector to leverage operations.[7]. Examples of crimes enabled by AI that can create issues of liability include tricking face recognition, access denial to online activities, autonomous drone attacks, cyber-attacks based on machine learning, data poisoning, misuse of robots, and manipulation of stock markets.[8].

---

[1]Lacey, Nicola, and Hanna Pickard. "Why Standing to Blame May Be Lost but Authority to Hold Accountable Retained: Criminal Law as a Regulative Public Institution." *The Monist* 104, no. 2 (2021): 265-280.

[2]Khan, Khushboo Farid, Atif Ali, Zulqarnain Farid Khan, and Hajra Siddiqua. "Artificial Intelligence and Criminal Culpability." In *2021 International Conference on Innovative Computing (ICIC)*, pp. 1-7. IEEE, 2021.

[3]Goel, Ruchi, and Pooja Gupta. "Robotics and industry 4.0." *A Roadmap to Industry 4.0: Smart Production, Sharp Business and Sustainable Development* (2020): 157-169.

[4]Brundage, Miles, Shahar Avin, Jack Clark, Helen Toner, Peter Eckersley, Ben Garfinkel, Allan Dafoe et al. "The malicious use of artificial intelligence: Forecasting, prevention, and mitigation." *arXiv preprint arXiv:1802.07228* (2018).

[5]King, Thomas C., Nikita Aggarwal, Mariarosaria Taddeo, and Luciano Floridi. "Artificial intelligence crime: An interdisciplinary analysis of foreseeable threats and solutions." *Science and engineering ethics* 26 (2020): 89-120.

[6]Sukhodolov, Alexander P., Artur V. Bychkov, and Anna M. Bychkova. "Criminal policy for crimes committed using artificial intelligence technologies: state, problems, prospects." (2020).

[7]Surden, Harry. "Artificial intelligence and law: An overview." *Georgia State University Law Review* 35 (2019): 19-22.

[8]Caldwell, Matthew, Jerone TA Andrews, Thomas Tanay, and Lewis D. Griffin. "AI-enabled future crime." *Crime Science* 9, no. 1 (2020): 1-13.

Whereas AI has demonstrated remarkable potential for making unpredictable decisions in various technological, administrative, managerial, and financial domains, it has also had significant involvement in deadly accidents that raise questions regarding its criminal liability.[9]. This issue becomes complicated when considering the fact that more AI-based crimes can be committed in the future without the feasibility of holding humans or corporate organisations responsible for them. The two primary actors of criminal liability, Actus Reus (an act of crime or omission) and mens rea (criminal intent), are necessary to rule out any criminal liability under the course of legal proceedings based on established principles and rules.[10]. However, the use of AI in the legal sphere can become challenging due to the impositions of legal implications asserted by criminal law, e.g. the establishment of mens rea for an act of crime, in terms of using robots to target a civilian property during the outbreak of war, since human control is one of the foremost element when holding a person liable for an offence.[11].

Therefore, the creation of super-intelligent artificial beings is challenging the sanctions imposed by criminal law due to the absence of human liability. The element of mens rea is deeply associated with Actus Reus because it establishes the intent for the assertion of criminal liability, which, in the case of AI-driven technology, becomes difficult.[12]. To execute legal proceedings against any damage caused by autonomous systems or devices, it is critical to consider Actus Reus, which denotes the actual occurrence of either committing or omitting a specific act in a crime.[13]. Therefore, it is crucial to identify whether charges levied against AI (organisations using AI or machines empowered by AI capabilities) are based on certain actual physical acts liable to be prosecuted. Furthermore, [14]Highlighted that the question of criminal liability has become more complicated while considering the concept of Actus Reus or the act of guilt which refers to physical conduct or act which has been used to commit the crime.

The Actus Reus constitutes a significant external element of an offence, indicating behaviours, circumstances, and consequences involved in the occurrence of a criminal activity.[15]. While analysing the Actus Reus element, it is important to identify which actors are involved in the criminal act. The main determinants of criminal liability can be the ability and the impact of an entity to cause certain consequences. The Actus Reus is also related to the failure to carry out a specific act, which implies that it also considers omissions while discussing criminal liability in a

[9]Claussén Karlsson, Matilda. "Artificial intelligence and the external element of the crime: an analysis of the liability problem." (2017).

[10]Cross, Noel. "Criminal justice, Actus Reus and mens rea." In *Forensic Psychology, Crime and Policing*, pp. 108-113. Policy Press, 2023.

[11]Bo, Marta. "Autonomous Weapons and the Responsibility Gap in light of the Mens Rea of the War Crime of Attacking Civilians in the ICC Statute." *Journal of International Criminal Justice* 19, no. 2 (2021): 275-299.

[12]Dimitrova, R. "Criminal Liability Associated with Artificial Intelligence Entities under the Bulgarian Criminal Law." In *2022 XXXI International Scientific Conference Electronics (ET)*, pp. 1-5. IEEE, 2022.

[13]Quattrocolo, Serena. "The impact of AI on criminal law a, and its twofold procedures." In *ResearchHandbook on the Law of Artificial Intelligence*, pp. 385-409. Edgar Elgar, 2018.

[14]Lima, Dafni. "Could AI agents be held criminally liable: artificial intelligence and the challenges for criminal law." *SCL Rev.* 69 (2017): 677.

[15]Khudaykulov, F. Kh. "The Objective Side of Crime and the Actus Reus Concept: Comparative-Legal Analysis, Problems and Proposals." *International Journal of Advance Scientific Research* 2, no. 12 (2022): 100-115.

specific scenario.[16]. Notably, the voluntariness related to criminal behaviour is a fundamental concept that forms the basis for Actus Reus in criminal law. This implies that harms or damages caused mistakenly by AI-enabled machines without the involvement of the human factor raise the critical question of determining criminal liability.

As per [17], criminal liability is to be considered as the fundamental factor to sentence an individual or a legal entity for a particular criminal act. The Actus Reus and mens rea requirements for criminal responsibility have to be met in deciding criminal liability in the use of AI. Whereas Mens Rea is indicative of the determined intention to carry out a criminal activity, the Actus Reus is concerned with deciding about the actual occurrence of the act in a crime. Since AI technologies have the potential to be both beneficial and harmful, depending upon their use and the underlying motives, it is essential to develop related legislation comprehensively to address focal as well as lateral aspects of criminal activities. The issue of the agency has, however, complicated the process, since the AI system has been unable to hold directly responsible for its actions and does not have legal personhood. Rather, [18]Authors stated that the focus in determining criminal liability in AI-based activities has shifted from autonomous machines to organisations and individuals responsible for implementing, developing and using AI systems. The concept of criminal liability in the field of AI technology is quite new and there are various legal frameworks which have been evolving to help address the challenges presented by AI technology. [19]Researchers emphasised that contemporary legal frameworks are incapable of handling the complicated tasks surrounding criminal liability and artificial intelligence. Hence, this paper seeks to explore critical aspects of Actus Reus of criminal liability for artificial intelligence.

Besides, artificial intelligence crime (AIC) research exists in a scattered condition across different disciplines, including robotics, psychology, computer science, and legal studies.[20]. In current scenarios involving issues of criminal liability, the lack of AIC research reduces the scope of projections as well as solutions. To enhance the understanding of AIC, this research carries out a systematic review of the relevant academic literature available. Therefore, it is essential to highlight whether human responsibility can be stretched for establishing liability over the Actus Reus element committed by an AI-driven technology, especially when the elements of criminal law and its proceedings are being constrained due to the absence of mens rea in AI.

Problem Statement

AI's unrelenting integration into business and daily life has changed our lives. AI's widespread use has caused issues, particularly in criminal responsibility, where Actus Reus is the most problematic

[16]Mallorquí-Ruscalleda, Enric. "The Elements of a Crime: a Brief Study on Actus Reus and Mens Rea." (2020).

[17]Lagioia, Francesca, and Giovanni Sartor. "Ai systems under criminal law: a legal analysis and a regulatory perspective." *Philosophy & Technology* 33, no. 3 (2020): 433-465.

[18]Rakova, Bogdana, Jingying Yang, Henriette Cramer, and Rumman Chowdhury. "Where responsible AI meets reality: Practitioner perspectives on enablers for shifting organisational practices." *Proceedings of the ACM on Human-Computer Interaction* 5, no. CSCW1 (2021): 1-23.

[19]Barfield, Woodrow, and Ugo Pagallo, eds. *Research handbook on the law of artificial intelligence*. Edward Elgar Publishing, 2018.

[20]King, Thomas C., Nikita Aggarwal, Mariarosaria Taddeo, and Luciano Floridi. "Artificial intelligence crime: An interdisciplinary analysis of foreseeable threats and solutions." *Science and engineering ethics* 26 (2020): 89-120.

factor. AI-driven technologies are making Actus Reus, the physical act or activity that commits a crime, harder. These autonomous devices question criminal responsibility systems. This study fills theory and practice gaps on criminal responsibility in AI-driven technologies in light of these changing situations. Without human intervention, Actus Reus must blame non-human entities that can make their own decisions. The regulation and governance of AI applications and the adaptation of legal frameworks to rapid technological advances need understanding and approaching this new legal frontier.

Furthermore, this paper seeks to investigate to solve the liability problem by answering the following questions:

Research Questions

1. Who should be liable for criminal activities committed mistakenly by AI-enabled machines, and why?
2. Under what conditions can a crime be considered to have been committed by AI?
3. What defences can be considered to invalidate the criminal liability of AI-enabled machines?

Theoretical Guidance

This study suggested an implicit agreement with criminal liability legal theories and ethics. According to the report, it seeks to fill gaps and obstacles in legal and ethical paradigms for AI-driven technology. Actus Reus, Mens Rea, and the transition from individual to organisational liability are theoretically based on legal philosophy and applying legal ideas to developing technological circumstances. The reliance on an international regulatory framework suggests transnational governance and legal standard harmonisation theories.

The study appears to use legal theory, ethics, and technological governance to investigate AI-driven system criminal culpability. Theoretical ideas on accountability, responsibility, and legal culpability in autonomous technologies can indirectly drive the investigation, bridging literature and practice gaps.

2.0 LITERATURE REVIEW

AI technology has brought changes in human living from personal assistants and chatbots to self-driving cars and facial recognition software; AI-driven technology has rapidly developed and become integrated into many industries.[21]. However, with these advancements, legal and ethical questions about accountability and liability, particularly in criminal contexts, have arisen. The utilisation of AI technology in several fields and industries is becoming increasingly common. As the technology progresses, it raises new legal questions, specifically in the area of criminal liability.[22]. The Actus Reus element of criminal liability pertains to the external element of a crime,

[21]Soni, Neha, Enakshi Khular Sharma, Narotam Singh, and Amita Kapoor. "Impact of artificial intelligence on businesses: from research, innovation, market deployment to future shifts in business models." *arXiv preprint arXiv:1905.02092* (2019).

[22]Cath, Corinne, Sandra Wachter, Brent Mittelstadt, Mariarosaria Taddeo, and Luciano Floridi. "Artificial intelligence and the 'good society': the US, EU, and UK approach." *Science and engineering ethics* 24 (2018): 505-528.

that is, the physical act or conduct that constitutes the offence.[23]. This raises questions regarding who should be held liable for any injuries or losses caused by the actions of a system in the context of technology driven by artificial intelligence (AI). Because AI systems may not have the same cognitive powers as humans, existing legal frameworks centred on the concepts of purpose, carelessness, and negligence will not be enough to govern their behaviour. This emphasises the importance of developing new legal frameworks that are better suited to addressing the special challenges brought by artificial intelligence technology. According to researcher [24] One option for addressing the issue of AI system responsibility is to use a severe liability threshold. Owners and developers of artificial intelligence systems would be held accountable for the behaviours of their creations, regardless of whether the AI was intended to cause harm.[25]. However, this technique raises concerns regarding how much money should be awarded as damages and about the plan's potential unintended consequences, i.e. a delay in artificial intelligence (AI) research and development.

According to the conclusions of Coeckelbergh's research[26] , one of the essential concepts of criminal law is that an individual can only be held liable for a crime if it was done freely or if it was a failure to perform a duty. When applied to AI-driven technology, the Actus Reus element encounters a variety of difficulties. The Actus Reus is the exterior or physical part of a crime, such as the act or omission that constitutes the offence.[27]. When applied to the setting of AI-driven technology, the Actus Reus factor,[28] Significantly complicates the process of determining who or what is responsible for the behaviours of an AI system. As artificial intelligence (AI) technologies continue to be created and applied in numerous domains, i.e. criminal justice and law enforcement systems, it is critical to have a good understanding of the potential ethical and legal consequences of adopting AI technology. [29]A number of high-profile incidents have highlighted the importance of performing deeper research into the Actus Reus component of AI-driven technology. Autonomous vehicles and the use of face recognition technology in law enforcement are two areas where artificial intelligence has been used maliciously or to support criminal conduct.[30].

Research using artificial intelligence (AI) in criminal justice and law enforcement has sparked debate about the extent to which such systems can be used to make decisions that have far-reaching consequences for people's lives. AI systems can, for example, determine who should be detained

---

[23]Robinson, Paul H. "Should the criminal law abandon the Actus Reus-mens rea distinction?." (1993).

[24]Giuffrida, Iria. "Liability for AI decision-making: some legal and ethical considerations." *Fordham L. Rev.* 88 (2019): 439.

[25]Bartneck, Christoph, Christoph Lütge, Alan Wagner, and Sean Welsh. *An introduction to ethics in robotics and AI*. Springer Nature, 2021.

[26]Coeckelbergh, Mark. "Artificial intelligence, responsibility attribution, and a relational justification of explainability." *Science and engineering ethics* 26, no. 4 (2020): 2051-2068.

[27]Stasi, Alessandro, and Alessandro Stasi. "Actus Reus and Mens Rea." *General Principles of Thai Criminal Law* (2021): 25-30.

[28]Dobrinoiu, Maxim. "The influence of artificial intelligence on criminal liability." *LESIJ-Lex ET Scientia International Journal* 26, no. 1 (2019): 140-147.

[29]Smith, M., & Miller, S. (2022). The ethical application of biometric facial recognition technology. *Ai & Society*, 1-9.

[30]Ligeti, Katalin. "Artificial Intelligence and Criminal Justice." In *AIDP-IAPL International Congress of* 2019.

or imprisoned, released on parole or bond, and prosecuted.[31]. As the decisions made by AI systems may have far-reaching consequences not only for individuals but also for society as a whole, these systems must be transparent, accountable, and unbiased. One of the main challenges in assigning criminal liability to AI systems is the fact that they operate using complex algorithms that are often difficult to understand or interpret. Crimes performed by an AI can be attributed to humans since they were either caused by individuals using it, the programming seemed flawed, or it was predictable how it might do so if not regulated properly. Using the current criminal law system, criminal liability might be assigned to its consumers in each of these situations. [32]The author highlighted that when AI operates inexplicably and independently in such circumstances, the issue of holding AI directly criminally liable for its actions emerges. Additionally, AI systems can learn and adapt over time, which means that their behaviour can be unpredictable and difficult to control. The laws and guidelines of the current criminal code do not address crimes executed by artificial intelligence that are indistinguishable from those committed by individuals. Therefore, it is crucial to address the problem of putting AI effectively under criminal liability. [33]Authors argued that AI could not AI fail to satisfy criminal responsibility since it is unable to understand the significance of its conduct or activity and, therefore, results in consequences. After recognising an incident, AI either imitates the behaviours of people who have experienced it before or simply reacts automatically in accordance with the regulations, without understanding the significance of its conduct. To address these challenges, legal and ethical frameworks have been developed to guide the use of AI in criminal contexts. These frameworks typically involve assessing the potential risks and benefits of AI systems, identifying the specific contexts in which AI systems can be used, and determining the appropriate level of human oversight and control.[34].This study addresses the problems faced by the current legal system in determining criminal liability in the use of AI-enabled machines or systems. Thorough research is required to establish if an AI-based activity can be considered criminal activity and to identify the actual legal entity responsible for the occurrence of a specific crime.

Gaps in Literature and Practice

Since AI-based technologies and innovations demonstrate extensive prevalence in industrial, commercial, and household uses, they are likely to cause harm or injury due to their potential to think, analyse, and act in a specific, programmed way.[35]. Consequently, the question of criminal accountability arises with various dimensions involved, specifically those related to Actus Reus and Mens Rea elements of AI-powered activities. Notably, the current law systems prove to be incompetent in addressing the issues arising from the existing or potential harms caused by

[31]Završnik, Aleš. "Criminal justice, artificial intelligence systems, and human rights." In *ERA forum*, vol. 20, no. 4, pp. 567-583. Berlin/Heidelberg: Springer Berlin Heidelberg, 2020.

[32]Lima, Dafni. "Could AI agents be held criminally liable: artificial intelligence and the challenges for criminal law." *SCL Rev.* 69 (2017): 677.

[33]Lagioia, Francesca, and Giovanni Sartor. "Ai systems under criminal law: a legal analysis and a regulatory perspective." *Philosophy & Technology* 33, no. 3 (2020): 433-465.

[34]Gupta, Jhanavi. "Artificial Intelligence in Legal System: An Overview." *Issue 3 Int'l JL Mgmt. & Human.* 4 (2021): 6076.

[35]Amershi, Saleema. "Toward responsible AI by planning to fail." In *Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining*, pp. 3607-3607. 2020.

autonomous systems. Previous studies have also less focussed on assessing the social and legal implications of AI-driven technological systems' criminal liability because of their complex nature.[36]. Empirical evidence shows, however, a number of fears of the scientists regarding the threats lying potentially in the increasingly automated world based on the capabilities of artificial intelligence.[37]. These concerns call for monitoring and regulating the development and implementation of AI-based applications for the industry by introducing legal amendments to the present jurisdiction and enhancing its capabilities to determine the criminal activities enabled through modern AI systems. Current literary studies have not discussed significant issues concerning modern applications of AI, e.g. the automated defence systems and the threats related to which can have tremendous effects on conditions of peace. It is critical to examine the need for establishing direct legal regulations to decide who is responsible for causing harm or injury in AI-enabled applications.

Therefore, research is necessary to determine the extent to which corporations can be held responsible for damages caused by AI-enabled devices or systems within the workplace.[38]. There can be safety concerns undoubtedly that should be socially tolerated, specifically related to robots that are dedicated to serving the public good. It is crucial to identify a solution that falls somewhere in the middle by modifying the rules of the law and allowing for a certain degree of fault tolerance in the implementation of AI-enabled systems.[39]. Ensuring a balance between the benefits of technological advancement and the risks that those advancements may pose needs to be researched thoroughly to provide relevant theoretical and empirical evidence.

The rapid growth of AI applications for industries has given rise to complex liability problems, which regulators and policymakers will need to solve to ensure the market's continued success.[40]. The generalised solutions that can be applied to a variety of situations and contexts are unavailable to ensure seamless jurisdictional proceedings. The current lack of literary articles on determining the criteria to find out criminal liability for the disasters of completely autonomous systems calls for extensive research to provide dimensions for developing the international regulatory framework. It also requires taking into consideration the complex and sophisticated nature of the machines used by small and large companies. The higher the degree to which a system is able to operate on its own, the more difficult it is to devise rules that effectively govern accountability for damaging activities.[41]. It is critical to conduct research for a transition away from a liability model

---

[36]Dobrinoiu, Maxim. "The influence of artificial intelligence on criminal liability." *LESIJ-Lex ET Scientia International Journal* 26, no. 1 (2019): 140-147.

[37]Benbya, Hind, Stella Pachidi, and Sirkka Jarvenpaa. "Special issue editorial: Artificial intelligence in organisations: Implications for information systems research." *Journal of the Association for Information Systems* 22, no. 2 (2021): 10.

[38]Dremliuga, Roman, and Natalia Prisekina. "The Concept of Culpability in Criminal Law and AI Systems." *J. Pol. & L.* 13 (2020): 256.

[39]Matheny, Michael, S. Thadaney Israni, Mahnoor Ahmed, and Danielle Whicher. "Artificial intelligence in health care: The hope, the hype, the promise, the peril." *Washington, DC: National Academy of Medicine* 10 (2019).

[40]Cobbe, Jennifer, and Jatinder Singh. "Artificial intelligence as a service: Legal responsibilities, liabilities, and policy challenges." *Computer Law & Security Review* 42 (2021): 105573.

[41]Raikov, Alexander N., and Massimiliano Pirani. "Human-Machine Duality: What's Next in Cognitive Aspects of Artificial Intelligence?." *IEEE Access* 10 (2022): 56296-56315.

that focuses on individual liability to one that is concerned with organisational liability.[42]. Unless the responsibility of specific agents can be demonstrated beyond a reasonable doubt, imposing criminal accountability on the corporation as a whole can be considered an effective way to proceed with legal action.

4.0 MATERIALS AND METHODS

This study involves a systematic review of the extant research studies conducted on the liability of artificial intelligence in crime. A systematic review of literature entails locating, reviewing, and analysing authentic research articles related to the chosen phenomenon for examination. A systematic review is characterised by three distinct phases, i.e. planning the study, carrying out the review, and preparing the report to present the findings.[43]. The planning phase involves clearly developing the research questions and considering them to search for evidence in the literature review. The review involves analysing previous studies to determine the current level of investigation and the existing body of knowledge on the chosen issue. In this study, the keyword method has been employed to search relevant content from the databases identified for research. These keywords include “artificial intelligence” (AI), “criminal liability”, “Actus Reus”, “AI-driven technology”, and “artificial intelligence crime” (AIC). While selecting related research articles, Science Direct, ProQuest, Emerald, EBSCO, and other databases available online have been consulted.

Furthermore, it is noteworthy that the quality of research is highly reliant on the inclusion and exclusion criteria set for selecting the sources of information used. These criteria determine the level of objectivity, authenticity, and relevance of the content used from specific sources in the intended study. The inclusion and exclusion criteria, if well-defined, can enhance the uniformity of the collected data based on more similarities in the context and background set for conducting those studies.[44]. To select the literary sources for this study, 165 articles were located initially. Any studies published more than ten years ago or written in a language other than English were not included in the study. Then, the effort was made to select only the articles included in peer-reviewed journals to enhance the credibility of the research. A peer-reviewed research study is one that researchers have evaluated through their expert opinions. Thus, from the initially selected 165 articles, 70 were left in the selection as others did not fulfil the criteria for selection. Based on the search keywords, relevant data from these research articles was organised in the Excel spreadsheets. These sheets provided a summary of the search made for collecting research data, presented in a tabular format comprising titles of the research articles, names of the authors, journal titles, years of publications, journal volume numbers, journal issue numbers, names of the publishing groups, areas of concern, search keywords, links to the webpages, and abstracts. Moreover, percentages, graphs, and charts were used to present the analysis findings. Finally, a

[42]Giuffrida, Iria. "Liability for AI decision-making: some legal and ethical considerations." *Fordham L. Rev.* 88 (2019): 439.

[43]Linnenluecke, Martina K., Mauricio Marrone, and Abhay K. Singh. "Conducting systematic literature reviews and bibliometric analyses." *Australian Journal of Management* 45, no. 2 (2020): 175-194.

[44]Keung, Emily Z., Lisa M. McElroy, Daniela P. Ladner, and Elizabeth G. Grubbs. "Defining the study cohort: inclusion and exclusion criteria." *Clinical Trials* (2020): 47-58.

comprehensive analysis was conducted to analyse the themes emerging from the collected data to explain significant aspects of the research issue chosen.

We need to construct the tables for analysis.

Table 1: Criteria for Inclusion and Exclusion of Research Articles

Sr. #	Inclusion Criteria	Exclusion Criteria
1	Discussing at least one or more keywords chosen for research	Not discussing or including any of the keywords used for article search
2	Written in the English language	Not written in English
3	The article has been peer-reviewed	Not reviewed or endorsed by peers
4	The article is not a duplicate	Article is duplicate

Table 2: Process of Reaching the Final Number of Selected Articles Using the Exclusion Criteria

Name of the Database used	Keywords	The number of articles identified initially	Number of articles after excluding those written in languages other than English	Number of articles after excluding those that do not have any keywords selected	Number of articles after excluding non-peer-reviewed studies	Number of articles after excluding duplicate studies
Science Direct	Actus Reus artificial intelligence crime					
ProQuest	criminal liability AI-driven technology					
Emerald	artificial intelligence crime AI-driven technology					
EBSCO	Actus Reus criminal liability					
Total	**165**					**70**

Table 3: Keywords Used in the Articles

Sr. #	Keywords
1	Artificial intelligence
2	Criminal liability
3	Actus Reus
4	AI-driven technology
5	Artificial intelligence crime

Based on the nature and scope of this study, the doctrinal research method has been used to describe and analyse the law that is related to the specific area of investigation chosen for research. It implies identifying the specific research problem, determining the research aim, and narrowing the research scope by making the research questions specific. To augment the efficacy of this method, empirical evidence and academic research have also been included in the information sources selected. Collectively, this study draws upon the legal doctrine, empirical studies, and academic discourses and benefits from different perspectives, including sociological, psychological, and scientific perspectives, to analyse the Actus Reus element of AI-based technology. This strategy allows researchers to achieve research goals, exhibit findings, and make useful recommendations.

To examine AI-driven autonomous machine actions' Actus Reus regulations, criminal law and ordinary legal technique have been considered. Mens Rea is also important in evaluating the criminal responsibility of artificial intelligence, thus it's important to examine machines' consciousness and decide if they're guilty of a crime. This study uses empirical data from neuroscience, robotics, sociology, and psychology to create a successful methodological approach. It entails a systematic literature review to collect the required information in less time, retaining the focus of the study. A systematic literature review involves categorising the literary sources based on pre-determined criteria and organising information derived from those sources to address the objectives of the study. This study uses data from the selected sources relevant to the research topic, which includes academic papers, news articles, legal documents, and court transcripts.

Furthermore, it is worthy to mention that the study employs a qualitative research approach that is characterised by conducting a systematic exploration of a chosen phenomenon in a specific context. Qualitative research involves an inquiry into individual experiences, group behaviours, organisational functions, or relationships shaped by interactions between stakeholders in a given scenario. The information collected has been analysed by implementing thematic data analysis to identify recurring patterns, meanings, and themes in the data sources used. Based on the findings of this data analysis, gaps in research have been addressed, and effective recommendations have been provided for related jurisdictive activities as well as potential future research on the issue.

Analysis

For attribution of liability of offence in case of AI[45], presented that the chain of sequences prior to the commission is crucial in this regard. If a limited AI tool or software is run and operated by Humans, the operator is responsible for any criminal act done by or through the AI. For fully

[45]Bartneck, Christoph, Christoph Lütge, Alan Wagner, and Sean Welsh. *An introduction to ethics in robotics and AI*. Springer Nature, 2021.

automatic machines, the contributor and the wrongs that occurred in the operational capacity, the company or creator is responsible. According to [46]Scholar (2021), an association of liability to someone requires the proof of elements of Mens Reus and Actus Reus; proving this in criminal cases is highly complex when AI tools are built much faster. AI machines being open to more input and built with a high speed cannot be comprehended by Humans, making humans accountable for their crimes require that such a person understands the underlying grounds behind certain act. [47] It refers to the determination of criminal liability in the context of AI-operated automatic tools.

They maintain that for known risk, the creator or operator can be made accountable. However, in case of an unexpected act which amounts to an offence, it is hard and complicated to transcribe the criminal liability. According to[48] In their paper, there are very grey areas (legal issues where the ruling is carried out in different ways by different judges even though the law is clear and the judges ensure to rule similarly, e.g. criminalisation of risk-taking behaviours and war crime criminalisation-related to indiscriminate attacks) in the current legal regime in the context of transcribing criminal liability for a crime committed by automated weapons and the legal framework shall provide the required context for this issue. Scholars, [49]Maintains that criminal liability is not attributable to AI as they do not have a will. Additionally, corporations (creators) can be held accountable for the acts of employees and products. Furthermore, they insist that ascribing AI criminal Liability to a human in cases where such criminal acts were unpredicted cannot be assigned to them.

The algorithm, the Random Darknet Shopper, started shopping on the dark web's online marketplace. It placed a random order on the dark web retailer Agora for an item, using a weekly budget of one hundred dollars in Bitcoins, and then had the item sent to the makers in Switzerland. At the end of 2014, a collection of objects, including a scanned passport and a Visa Platinum card, as well as phoney jeans and baseball caps outfitted with hidden cameras, were collected into an exhibition and displayed[50]. However, there was a glitch: the robot accomplished one of its shopping sprees by buying a bag of ecstasy pills undesirably. The incident sparked a number of contradictory issues about the likely involvement of bots in the crime. The question was raised if software creators should be held liable for a crime or if the software itself can be punished for committing a crime. The first entity that comes to mind is undoubtedly the programmer who gave the bot the instructions to carry out the purchase. However, the concern arises when considering

[46]Berk, Richard A. "Artificial intelligence, predictive policing, and risk assessment for law enforcement." *Annual Review of Criminology* 4 (2021): 209-237.

[47]Bo, Marta. "Autonomous Weapons and the Responsibility Gap in light of the Mens Rea of the War Crime of Attacking Civilians in the ICC Statute." *Journal of International Criminal Justice* 19, no. 2 (2021): 275-299.

[48]Brundage, Miles, Shahar Avin, Jack Clark, Helen Toner, Peter Eckersley, Ben Garfinkel, Allan Dafoe et al. "The malicious use of artificial intelligence: Forecasting, prevention, and mitigation." *arXiv preprint arXiv:1802.07228* (2018).

[49]Claussén Karlsson, Matilda. "Artificial intelligence and the external element of the crime: an analysis of the liability problem." (2017).

[50]Lien, Che-Hui, Maxwell K. Hsu, Jing-Zhi Shang, and Stephen W. Wang. "Self-service technology adoption by air passengers: a case study of fast air travel services in Taiwan." *The Service Industries Journal* 41, no. 9-10 (2021): 671-695.

the consequences of AI growth to become a more powerful tool in the future. Despite the fact that the Random Darknet Shopper's merchandise and bot were returned after three months, the Ecstasy tablets were thrown away. The artists were cleared of drug possession charges as the implications of the queries the artwork raised provided adequate justification for the exhibition of drugs as artefacts.

[51] Responsibility for a crime requires two things, i.e., control and knowledge. However, in the case of AI, where certain acts are the result of an accident or were not expected, then it is hard to determine who is responsible. According to scholar[52], the development of AI mandates new reforms in the field of criminal law, particularly in the context of criminal liability. They maintain that from the scheme of law, will and consciousness are necessary for inflicting criminal liability. It is for now only presumable that AI tools will reach the level of human intelligence, but now, there are no such instances observed. In the current scenario, for the offence committed by AI tools, only associates or producers can be held responsible. Suppose an AI tool causes harm to someone who is under the control or instruction of a human. In that case, such a human is responsible, but if a wrong is committed by AI, which its author reasonably presumed. He did not disclose it, such creator or producer will be assigned the criminal liability. Additionally, in the current legal regime, AI cannot be assigned criminal liability.

Moreover, Researchers[53] Explained that Artificial Intelligence is applied in health care, banking, retail, chatbots, smart cars and logistics for our daily routine work. Artificial intelligence developed and threats associated with involved in markets and social media based fraud. Current AI systems are capable of committing financial crimes or accelerating them. They suggested that present AI systems are not ethically informed for choices, so it is inappropriate to punish AI agents. [54] Elucidated in their research that there is a problem in implementation and poor regulation and implementations provide opportunities for criminal activity, unreliability and unintentional consequences.

Authors[55] (2023) study reported that Artificial Intelligence's role is incredible, and it is living in everyone's life with massive technology used to make unpredictable decisions. With unpredictable decisions, AI leads to crime, and the author emphasised that the USA must hold accountable creators, owners and users for their usage and ensure standards for their complete application.

[51]Coeckelbergh, Mark. "Artificial intelligence, responsibility attribution, and a relational justification of explainability." *Science and engineering ethics* 26, no. 4 (2020): 2051-2068.

[52]Dobrinoiu, Maxim. "The influence of artificial intelligence on criminal liability." *LESIJ-Lex ET Scientia International Journal* 26, no. 1 (2019): 140-147.

[53]Soni, Neha, Enakshi Khular Sharma, Narotam Singh, and Amita Kapoor. "Impact of artificial intelligence on businesses: from research, innovation, market deployment to future shifts in business models." *arXiv preprint arXiv:1905.02092* (2019).

[54]Broadhurst, Roderic, Donald Maxim, Paige Brown, Harshit Trivedi, and Joy Wang. "Artificial intelligence and crime." *Available at SSRN 3407779* (2019).

[55] Feiler, Jake. "The Artificially Intelligent Trolley Problem: Understanding Our Criminal Law Gaps in a Robot Driven World." *Hastings Sci. & Tech. LJ* 14 (2023): 1.

Kingston[56] (2016) explained that in terms of AI usage, criminal liability is still not completely established. The authors focused on whether the penalty should be on AI design creators or users of technology, and whether criminal activity should be practiced under civil law. Moreover,

A scholar [57] (2020) discussed the responsibility problem which is associated with the use of artificial intelligence. The research argued that the relational approach is good because it offers responsibility as answerability. Duan[58] (2021) provided the jurisdictional overview of China regarding Artificial Intelligence. According to researchers, China is the leading country in artificial intelligence and now has rules and regulations for artificial intelligence-based production and has potential relevance to other jurisdictions.

In their [59] Paper, they explained that the future of artificial intelligence is still unclear because of no legal action, and a third party or another entity controls it. So, it is not easy to penalise either technology or the creator. [60]Authors favoured criminal and civil law and described that both should be analysed in the context of an AI system. They introduced the framework to penalise the AI systems because there was a limitation I civil and criminal law, particularly in the AI system. A study by[61] AI usage in Indonesia also showed that Health Law 2009 permits AI-driven healthcare innovations, while Indonesian criminal law charges AI doctors for damaging actions. Doctors and connected parties are responsible for using AI doctors.

The Fourth Industrial Revolution (4IR) combines physics, digitalisation, and biological technologies, transforming the information technology world. AI and decision-making have advanced, and the question arises whether criminal culpability against AI organisations will be enforceable. A researcher [62]Said that renowned experts have shown their concerns regarding the excessive use of artificial intelligence. The author also suggested in the study that robots are doing more crimes than others who are directly or indirectly, so there should be a punishment mechanism because we cannot punish robots directly. Authors [63]Elucidated the legal debate on criminal

[56]Kingston, John KC. "Artificial intelligence and legal liability." In *Research and Development in Intelligent Systems XXXIII: Incorporating Applications and Innovations in Intelligent Systems XXIV 33*, pp. 269-279. Springer International Publishing, 2016.

[57]Coeckelbergh, Mark. "Artificial intelligence, responsibility attribution, and a relational justification of explainability." *Science and engineering ethics* 26, no. 4 (2020): 2051-2068.

[58]Duan, Zhuozhen. "Artificial Intelligence and the Law: Cybercrime and Criminal Liability. By Dennis J. Baker and Paul H. Robinson (Routledge, 2021, 280pp.£ 120 hb)." (2022): 257-259.

[59]Mulya, Muhammad Oscar Dharma Putra, and Mahrus Ali. "Artificial Intelligence Crime within the Concept of Society 5.0: Challenges and Opportunities for Acknowledgment of Artificial Intelligence in Indonesian Criminal Legal System." *International Journal of Law and Politics Studies* 5, no. 1 (2023): 07-15.

[60]Chandra, Rushil, Karun Sanjaya, A. R. Aravind, Ahmed Radie Abbas, and Ruzieva Gulrukh. "Algorithmic Fairness and Bias in Machine Learning Systems." In *E3S Web of Conferences*, vol. 399, p. 04036. EDP Sciences, 2023.

[61]Hakim, Wahyu Luqmanul, Muhammad Fulki Fadhillah, Sungjae Park, Biswajeet Pradhan, Joong-Sun Won, and Chang-Wook Lee. "InSAR time-series analysis and susceptibility mapping for land subsidence in Semarang, Indonesia using convolutional neural network and support vector regression." *Remote Sensing of Environment* 287 (2023): 113453.

[62]Jhudele, Priyam. "On Robot Crimes and Punishments." *NLIU L. Rev.* 6 (2016): 1.

[63]Gill, T., 2020. Blame it on the self-driving car: how autonomous vehicles can alter consumer morality. *Journal of Consumer Research*, *47*(2), pp.272-291.

liability for AI systems has gained momentum. This study examined their ability to meet criminal liability criteria, including Actus Reus, mens rea, and accountability. It also discussed illegal activities by AI creatures, referencing the Random Darknet Shopper incident. An expert [64]Discussed industrial robots with self-control, comparing them to businesses, idols, and animals. It explored legal personhood, distinguishing between businesses and gods, and rejected animal personality. The article concludes and supports that robots are not eligible for personhood.

Researchers [65]Analysing the active use of AI raises legal and moral issues, particularly in the ambiguous ethical framework for data application and use. The article explored cybersecurity issues, criminological dangers, and assigning blame and compensation for harm caused by AI. It calls for acknowledging AI as a source of heightened risk. They proposed a legal fictitious method for AI's non-standard legal personality perception.

While discussing authors[66] Explained that AI deployment raised ethical dilemmas and legal concerns, prompting immediate action. Legal provisions governing AI personhood are examined, and alternatives for accountability are developed. Ethical frameworks are needed for AI creation, design, manufacturing, usage, and modification, and AI is acknowledged as a risk indicator. The resolution of the European Parliament concerning AI's legal standing is examined in this article, with an emphasis on its legal personality.

The Industrial Revolution 4.0 has sparked concerns among those unprepared for its impact on the legal community. AI, a digital technology, can make sudden decisions, raising questions about accountability. Malaysian judiciary investigates AI in sentencing due to its promising characteristics but faces challenges like carelessness, vicarious liability, and criminal activity.

Author [67] Stated that AI systems are increasingly advocating for legal personality as they take on societal responsibilities. These arguments often compare AI systems to legal entities like corporations, suggesting they should be allowed equal status to natural persons. However, these justifications are insufficient to support this claim. Another researcher [68]Identified AI components contributing to responsibility gaps and highlighted their significance. The study discusses the responsibility gap associated with artificial intelligence and argues that this gap is a combination of different problems that are interconnected, comprising culpability gaps, active responsibility, and public and moral accountability. These problems relate to various societal, ethical, legal, organisational, and technical sources. Efforts to overcome the responsibility gap are fatalism (which presents the responsibility gap as a new and uncontrollable problem), deflationist (which

---

[64]Solaiman, Sheikh M. "Legal personality of robots, corporations, idols and chimpanzees: a quest for legitimacy." *Artificial intelligence and law* 25 (2017): 155-179.

[65]Begishev, Ildar, Zarina Khisamova, and Vitaly Vasyukov. "Technological, ethical, environmental and legal aspects of robotics." In *E3S Web of Conferences*, vol. 244, p. 12028. EDP Sciences, 2021.

[66]Bikeev, Igor, Pavel Kabanov, Ildar Begishev, and Zarina Khisamova. "Criminological risks and legal aspects of artificial intelligence implementation." In *Proceedings of the International Conference on Artificial Intelligence, Information Processing and Cloud Computing*, pp. 1-7. 2019.

[67]Chesterman, Simon. "All Rise for the Honourable Robot Judge? Using Artificial Intelligence to Regulate AI." *Using Artificial Intelligence to Regulate AI (October 19, 2022)* (2022).

[68]Pai, Vaibhav, and Shalini Chandra. "Exploring factors influencing organisational adoption of artificial intelligence (AI) in corporate social responsibility (CSR) initiatives." *Pacific Asia Journal of the Association for Information Systems* 14, no. 5 (2022): 4.

considers the responsibility gap as a false problem), and solutionism (which indicates that the responsibility gap can be addressed by using new legal or technical tools). The article proposes developing socio-technical systems for meaningful human control to solve duty gaps with AI.

5.0 CONCLUSION AND RECOMMENDATIONS

Conclusions

A systematic review of the literature provided a brief analysis where different authors quoted different experts and provided the cases and laws of different countries. Thirty articles related to our objectives were shortlisted for review. Provided that certain conditions are met, any individual, company, or other legal organisation can be held legally liable for illegal activities. As artificial intelligence technology is rapidly progressing, current legal remedies are required to protect society from the hazards posed by it that are not permitted by criminal law. Individuals, corporations, or even the Al itself could pose a danger to the existing social order. Corporations, non-human entities, and AI are all increasingly participating in human activities. The concept of criminal culpability for AI is theoretically identical to that of legal entities. It would be absurd to treat it differently than companies by refusing to subject it to human laws. Punishment can be thought of as occurring within a larger context supplied by various conceptions of criminal guilt.

Existing criminal law offers numerous approaches to dealing with the issue of artificial intelligence, and the liability concerns generated by AI systems extend the boundaries of traditional criminal law. Since robots have to deal with a wide range of moral dilemmas, recognising them as legal persons has been critiqued by some as an unduly intricate solution. The most effective answer to the problem of liability is to impose a civil law supervisory responsibility with the duty to supervise the AI's behaviour to prevent the AI from engaging in illegal activities. The defendant's responsibility will eventually be established by what is just and reasonable given the facts of the case. The related personnel will be held liable for what the AI accomplishes because they are the only ones who could have predicted the harm that was created.

Key Recommendations

The development of a general artificial intelligence application or system is likely to result in considerable happiness and benefit for humanity. Efforts to impede this progress are undesired and should be discouraged. The potential advantages of using AI for improving human life significantly outweigh any potential disadvantages. The question of liability cannot be resolved simply by prohibiting damaging AI or pursuing corresponding legal action; both measures are insufficient. In a number of cases, the limited deployment of AI will not have a negative impact on the surroundings.[69]. However, the AI's future behaviour as a mediator can cause harm. Without AI, the behaviour of actors would be in accordance with social norms and legal requirements. This is not an attempt to attribute responsibility for AI development to a single person. The obligation to monitor and manage the AI and its operations begins the moment it is employed or deployed. It requires maintaining track of both the AI and its activity.

In some cases, being forced by law to keep an eye on an AI-enabled activity can be advantageous. As AI's behaviour is unpredictable, it is vital to maintain awareness at all times. If the monitoring

[69]Feiler, Jake. "The Artificially Intelligent Trolley Problem: Understanding Our Criminal Law Gaps in a Robot Driven World." *Hastings Sci. & Tech. LJ* 14 (2023): 1.

requirement includes control and management of AI, it is sufficient to assign a responsibility to the related actors to prevent injury from AI operations.[70]. Due to the intricacies associated with predictability and foreseeable effects, criminal law and the criminalisation of behaviour only address the question of responsibility to a limited extent. Instead, the responsibility for monitoring should be viewed as an obligation towards the law. Clarifying those in charge of monitoring the AI openly can help lessen the probability of confusion in this matter. It is critical to make clear decisions regarding ownership. As a sort of legal reparation, the owner or the one hired by the owner must be obliged to monitor AI.

[70]S., Thanush. "An Analysis of the Liability of Artificial Intelligence and Its Legislations." *Part 1 Indian J. Integrated Rsch. L.* 2 (2022): 1.

Appendix 1

Table 4: Published Articles Reviewed for this Study

Sr. #	Authors	Research Article Title	Year of Publication	Journal
1	Dobrinoiu, M.	The influence of artificial intelligence on criminal liability.	2019	LESIJ-Lex ET Scientia International Journal, 26(1), pp.140-147.
2	King, T.C., Aggarwal, N., Taddeo, M. and Floridi, L.	Artificial intelligence crime: An interdisciplinary analysis of foreseeable threats and solutions.	2020	Science and engineering ethics, 26, pp.89-120.
3	Zarina I, K., Ildar R, B. and Elina L, S.	Artificial Intelligence and Problems of Ensuring Cyber Security.	2019	International Journal of Cyber Criminology, 13(2).
4	Bikeev, I., Kabanov, P., Begishev, I. and Khisamova, Z.	Criminological risks and legal aspects of artificial intelligence implementation.	2019	Proceedings of the International Conference on Artificial Intelligence, Information Processing and Cloud Computing (pp. 1-7).
5	Yeoh, P.	Artificial intelligence: accelerator or panacea for financial crime?	2019	Journal of Financial Crime, 26(2), pp.634-646.
6	Feiler, J.	The Artificially Intelligent Trolley Problem: Understanding Our Criminal Law Gaps in a Robot Driven World.	2023	Hastings Sci. & Tech. LJ, 14, p.1.
7	Ivan, D.L. and Manea, T.	AI Use in Criminal Matters as Permitted Under EU Law and as Needed to Safeguard the Essence of Fundamental Rights.	2022	International Journal of Law in Changing World, 1(1), pp.17-32.
8	Sharma, H.	Artificial Intelligence and Law: An Effective and Efficient Instrument.	2021	9th International Conference on Reliability, Infocom Technologies and Optimisation (Trends and Future Directions) (ICRITO) (pp. 1-5). IEEE.

9	Broadhurst, R., Maxim, D., Brown, P., Trivedi, H. and Wang, J.	Artificial intelligence and crime.	2019	SSRN, 3407779.
10	Maas, M.M.	International law does not compute: Artificial intelligence and the development, displacement or destruction of the global legal order.	2019	Melbourne Journal of International Law, 20(1), pp.29-57.
11	Zekos, G.I. and Zekos, G.I.	AI and International Law.	2021	Economics and Law of Artificial Intelligence: Finance, Economic Impacts, Risk Management and Governance, pp.491-528.
12	Kingston, J.K.	Artificial intelligence and legal liability.	2016	Research and Development in Intelligent Systems XXXIII: Incorporating Applications and Innovations in Intelligent Systems XXIV 33 (pp. 269-279). Springer International Publishing.
13	Završnik, A. March.	Criminal justice, artificial intelligence systems, and human rights.	2020	ERA forum (Vol. 20, No. 4, pp. 567-583). Berlin/Heidelberg: Springer Berlin Heidelberg.
14	Chesterman, S.	Artificial intelligence and the limits of legal personality.	2020	International & Comparative Law Quarterly, 69(4), pp.819-844.
15	Villaronga, E.F., Kieseberg, P. and Li, T.	Humans forget machines: Artificial intelligence and the right to be forgotten.	2018	Computer Law & Security Review, 34(2), pp.304-313.
16	Santoni de Sio, F. and Mecacci, G.	Four responsibility gaps with artificial intelligence: Why they matter and how to address them.	2021	Philosophy & Technology, 34, pp.1057-1084.
17	, Bartneck, C., Lütge, C., Wagner,, M. Bo, M. (2021),	Artificial intelligence, responsibility attribution, and a relational justification of explainability.	2020	Science and engineering ethics, 26(4), pp.2051-2068.

18	Surden, H.	Artificial intelligence and law: An overview.	2018	Georgia State University Law Review, 35, p.1305.
19	Rahman, R.A. and Habibulah, R.	The criminal liability of artificial intelligence: is it plausible to Hitherto Indonesian criminal system?	2019	Legality: Jurnal Ilmiah Hukum, 27(2), pp.147-160.
20	Oraegbunam, I.K. and Uguru, U.E.	Artificial Intelligence Entities and Criminal Liability: A Nigerian Jurisprudential Diagnosis.	2018	African Journal of Criminal Law and Jurisprudence, 3, p.1.
21	King, T.	Projecting AI-Crime: A Review of Plausible Threats.	2019	The 2018 Yearbook of the Digital Ethics Lab, pp.65-84.
22	Hallevy, G.	The criminal liability of artificial intelligence entities-from science fiction to legal social control.	2010	Akron Intell. Prop. J., 4, p.171.
23	Padhy, A.K. and Padhy, A.K.	Criminal liability of the artificial intelligence entities.	2018	Nirma University Law Journal, 8, p.15.
24	Hallevy, G.	Unmanned vehicles: Subordination to criminal law under the modern concept of criminal liability.	2011	Journal of Law Information and Science, 21, p.200.
25	Mulya, M.O.D.P. and Ali, M.	Artificial Intelligence Crime within the Concept of Society 5.0: Challenges and Opportunities for Acknowledgment of Artificial Intelligence in Indonesian Criminal Legal System.	2023	International Journal of Law and Politics Studies, 5(1), pp.07-15.
26	Hallevy, P.	AI v. IP-Criminal liability for intellectual property IP offences of artificial intelligence AI entities.	2015	IP-Criminal Liability for Intellectual Property IP Offenses of Artificial Intelligence AI Entities.
27	Hayward, K.J. and Maas, M.M.	Artificial intelligence and crime: A primer for criminologists.	2021	Crime, Media, Culture, 17(2), pp.209-233.
28	Lee, S.W.	Can an Artificial Intelligence Commit a Crime?	2021	Legal Theory and Interpretation in a Dynamic Society (pp. 311-334). Nomos Verlagsgesellschaft mbH & Co. KG.

29	Mecaj, S.E.	Artificial Intelligence and legal challenges.	2022	Revista Opinião Jurídica (Fortaleza), 20(34), pp.180-196.
30	Daud, M.	Artificial Intelligence in the Malaysian Legal System: Issues, Challenges and Way Forward.	2022	Insaf-The Journal of the Malaysian Bar, 39(1), pp.1-24.
31	Ogunnoiki, K. and Oraegbunam, I.K.	A Critique of Gabriel Hallevy's Models of Criminal Liability of Artificial Intelligence Entities.	2022	International Journal of Comparative Law and Legal Philosophy, 4, p.1.
32	Rajpurohit, D.S. and Seal, R.	Legal definition of artificial intelligence.	2019	Supremo Amicus, 10, p.87.
33	Dimitrova, R.	Criminal Liability Associated with Artificial Intelligence Entities under the Bulgarian Criminal Law.	2022	2022 XXXI International Scientific Conference Electronics (ET) (pp. 1-5). IEEE.
34	Louis, M., Fernandez, A.A., Lee, N.A.M.S.K. and Yee, S.	Artificial Intelligence: Is it a Threat or an Opportunity based on its Legal Personality and Criminal Liability?	2021	Journal of Information System and Technology Management, 6 (20), pp. 01-09.
35	Chandra, R. and Sanjaya, K. January.	Punishing the Unpunishable: A Liability Framework for Artificial Intelligence Systems.	2023	International Conference on Digital Technologies and Applications (pp. 55-64). Cham: Springer Nature Switzerland.
36	Acquaviva, G.	Autonomous weapons systems controlled by Artificial Intelligence: a conceptual roadmap for international criminal responsibility.	2022	The Military Law and the Law of War Review, 60(1), pp.89-121.
37	Goel, V. and Tomer, A.	Determining the 'Responsibility' paradox - The Criminal Liability Of Artificial Intelligence in the Healthcare Sector.	2023	Russian Law Journal, 11(2s).
38	Gruodytė, E. and Čerka, P.	Artificial Intelligence as a Subject of Criminal Law: A Corporate Liability Model Perspective.	2020	Smart Technologies and Fundamental Rights (pp. 260-281). Brill.

39	Hakim, H.A., Kurniaty, Y., Krisnan, J. and Praja, C.B.E.	Artificial intelligence and medicine: Proposed model of Indonesian criminal liability.	2023	AIP Conference Proceedings (Vol. 2706, No. 1). AIP Publishing.
40	Stanila, L.	Living in the Future: New Actors in the Field of Criminal Law–Artificial Intelligence.	2020	Legal Science: Functions, Significance and Future in Legal Systems II, p.300.
41	Shestak, V. and Vvedenskaya, A.	Modern Features of Criminalization of Acts Committed Using Artificial Intelligence.	2022	SSRN, 4248412.
42	Ivanovic, A.R. and Pavlovic, Z.S.	Involving Artificial Intelligence in Committing a Crime as a Challenge to the Criminal Law of the Republic of Serbia.	2018	JE-Eur. Crim. L., p.46.
43	Atkinson, D.	Criminal liability and artificial general intelligence.	2019	The Journal of Robotics, Artificial Intelligence & Law, 2.
44	Gupta, J.	Artificial Intelligence in Legal System: An Overview.	2021	Issue 3 Int'l JL Mgmt. & Human., 4, p.6076.
45	Duan, Z.	Artificial Intelligence and the Law: Cybercrime and Criminal Liability.	2022	The British Journal of Criminology, 62(1), pp. 257–259.
46	Husti, G.M.	Action, Omission and Causality regarding Artificial Intelligence.	2021	Revista Themis, p.44.
47	Stevanovic, A. and Pavlovic, Z.	Concept, Criminal Legal Aspects of the Artificial Intelligence and its Role in Crime Control.	2018	JE-Eur. Crim. L., p.31.
48	Kumar, R. and Arora, D.	Artificial Intelligence: The Beginning of New Era.	2018	Supremo Amicus, 3, p.450.
49	Ally, A.M.	Impact of Disruptive Technologies on the Socio-Economic Development of Emerging Countries: Artificial Intelligence and Legal Liability in Tanzania.	2023	Impact of Disruptive Technologies on the Socio-Economic Development of Emerging Countries (pp. 1-14). IGI Global.
50	Putranti, D. and Anggraeny, K.D.	Inventor's Legal Liability upon the Invention of Artificial Intelligence in Indonesia.	2022	Varia Justicia, 18(1), pp.71-83.

51	Simmler, M. and Markwalder, N.	Guilty robots?–rethinking the nature of culpability and legal personhood in an age of artificial intelligence.	2019	Criminal Law Forum (Vol. 30, pp. 1-31). Springer Netherlands.
52	Falconer, S.	Advanced Introduction to Law and Artificial Intelligence.	2020	Law in Context. A Socio-legal Journal, 37(1), pp.187-189.
53	Trinh, T.V.	Models of Criminal Liability of Artificial Intelligence: From Science Fiction to Prospect for Criminal Law and Policy in Vietnam.	2019	VNU Journal of Science: Legal Studies, 35(4).
54	Jhudele, P.	On Robot Crimes and Punishments.	2016	NLIU L. Rev., 6, p.1.
55	Persaud, P.	Protecting against Ultron: Exploring the Potential Criminal Liability of Self-Programming Deep Learning Machines.	2019	Rutgers UL Rev., 72, p.577.
56	Santos Divino, S.B.	Critical considerations on Artificial Intelligence liability: e-personality propositions.	2020	Rev. Electronica Direito Sociedade, 8, p.193.
57	Chavhan, A.D.	Emergence of Artificial Intelligence and Its Legal Impact.	2022	Artificial Intelligence and the Fourth Industrial Revolution (pp. 191-218). Jenny Stanford Publishing.
58	Dosaeva, G.S., Ryabova, M.V., Seregina, E.V., Fomenko, I.V. and Kagulyan, E.A.	Artificial Intellect in Criminal Law: Issues of Governance, Regulation, and Prospect of Use.	2023	Technological Trends in the AI Economy: International Review and Ways of Adaptation (pp. 191-198). Singapore: Springer Nature Singapore.
59	Stănilă, L.	On the Necessity of Recognising Artificial Intelligence as Subject to Criminal Law–The Case of Autonomous Vehicles.	2019	Journal of Eastern European Criminal Law, (02), pp.40-54.
60	Scholten, N.	The robo-criminal.	2019	The Journal of Robotics, Artificial Intelligence &

				Law, 2(4), pp.263-283.
61	Lukitasari, D., Hartiwiningsih, H. and Wiwoho, J.	Strengthening the Use of Artificial Intelligence Through Sustainable Economic Law Development in the Digital Era.	2022	International Conference for Democracy and National Resilience 2022 (ICDNR 2022) (pp. 218-223). Atlantis Press.
62	Lagioia, F. and Sartor, G.	AI systems under criminal law: a legal analysis and a regulatory perspective.	2020	Philosophy & Technology, 33(3), pp.433-465.
63	Dremliuga, R. and Prisekina, N.	The Concept of Culpability in Criminal Law and AI Systems.	2020	J. Pol. & L., 13, p.256.
64	Lina, D.	Could AI Agents Be Held Criminally Liable: Artificial Intelligence and the Challenges for Criminal Law?	2018	South Carolina Law Review, 69(3), p.8.
65	Solaiman, S.M.	Legal personality of robots, corporations, idols and chimpanzees: a quest for legitimacy.	2017	Artificial intelligence and law, 25, pp.155-179.
66	Freitas, P.M., Andrade, F. and Novais, P.	Criminal liability of autonomous agents: From the unthinkable to the plausible.	2014	AI Approaches to the Complexity of Legal Systems: AICOL 2013 International Workshops, Revised Selected Papers (pp. 145-156). Springer Berlin Heidelberg.
67	Lee, Z.Y., Karim, M.E. and Ngui, K.	Deep learning artificial intelligence and the law of causation: application, challenges and solutions.	2021	Information & Communications Technology Law, 30(3), pp.255-282.
68	Osmani, N.	The complexity of criminal liability of AI systems.	2020	Masaryk University Journal of Law and Technology, 14(1), pp.53-82.
69	Naučius, M.	Should fully autonomous artificial intelligence systems be granted legal capacity?	2018	Law Review, 1(17), pp.113-132.
70	Ali, A.A. and Khalifa, M.M.	Critical Analysis of the Legal Elements of Crimes Committed in the Metaverse	2023	International Journal of Doctrine, Judiciary and

		in Light of Egyptian Criminal Law.		Legislation, 4(2), pp.735-755.