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The Criminal Liability of Artificial Intelligence Technologies

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Abstract

Artificial Intelligence (AI) has played a significant role in various life domains, with advanced nations increasingly relying on it for a multitude of public services and operations. In the rapidly advancing technological era, the use of AI technologies can lead to errors, prompting questions about the Liability of the designers of AI technologies for these mistakes. Concerns have arisen regarding the potential future substitution of human elements in many fields by these technologies. Therefore, thorough research and analysis of AI technologies and their errors are imperative.

Artificial Intelligence technologies, developed by technology companies and their designers, have yielded substantial progress in task completion, time efficiency, and cost savings. Governments have embraced these technologies; however, the errors associated with them pose a significant risk, necessitating the consideration of criminal liability for technology companies and their designers. It is crucial to recognize that Artificial intelligence, being a human creation, is not exempt from errors.

Keywords: *Liability, Criminal, Artificial Intelligence.*

1. INTRODUCTION

Due to the rapid development witnessed in the field of artificial intelligence and its impact on various aspects of human life, the world today is living in the era of information technology and artificial intelligence. These technologies have become an integral part of our daily lives. With the rapid advancement in this field, issues related to criminal Liability for artificial intelligence technologies have become a focal point of interest for many researchers and legal professionals.

This study aims to explore the legal challenges posed by artificial intelligence technologies regarding criminal Liability. Despite the benefits of these innovative technologies, they also raise legal issues related to ethical and legal matters associated with control and Liability.

These legal issues will be analysed through a multidisciplinary legal framework, where the study will discuss the potential criminal impacts of artificial intelligence technologies in various areas such as cybersecurity, privacy, facial recognition, big data analysis, and the legal issues related to determining criminal Liability for individuals and entities associated with the design, development, and use of artificial intelligence technologies. Different legal systems and legal standards applicable in various countries will be studied, in addition to analysing the challenges faced by artificial intelligence technologies in proving and enforcing criminal Liability.

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Research on the criminal Liability of artificial intelligence technologies represents a significant challenge for the legal and technological community, requiring extensive studies and collaborative efforts to establish an appropriate legal framework that achieves justice and balance in the use of these modern technologies.

The continuous and tremendous advancement in artificial intelligence technologies has led to the widespread introduction of these technologies on a large scale by both states and individuals. The problem in this research lies in a fundamental question: Who is responsible for bearing the criminal liability resulting from the errors of artificial intelligence? This main question branches out into several sub-questions as follows:

1- What is the importance of artificial intelligence and its functions for countries and individuals?

2- What are the fields and key applications of artificial intelligence?

3- What are the reasons for criminal liability for errors in artificial intelligence?

4- What are the pillars specific to criminal Liability for errors in artificial intelligence?

The importance of the study lies in the novelty and significance of the subject, as artificial intelligence has introduced remarkable technologies that have achieved considerable success. On the other hand, errors that may arise from it can significantly and seriously impact various fields where artificial intelligence has rapidly entered. The Kingdom of Saudi Arabia is one of the countries that has extensively and advancedly applied artificial intelligence. Therefore, it was necessary to study artificial intelligence, understand its fields and uses in the Kingdom of Saudi Arabia, and identify the reasons and pillars of criminal Liability for artificial intelligence errors. Based on these considerations, recommendations can be developed for the practical benefit of the Kingdom.

The study aims to understand the criminal Liability of designers of artificial intelligence technologies by exploring artificial intelligence, its importance, objectives, and the reasons for imposing criminal Liability on the designers of artificial intelligence technologies. The study also aims to clarify the specificity of criminal Liability in this field.

Study questions:

1- What is the importance of artificial intelligence and its functions for countries and individuals?

2- What are the fields and key applications of artificial intelligence?

3- What are the reasons for criminal liability for errors in artificial intelligence?

4- What are the pillars specific to criminal Liability for errors in artificial intelligence?

5- What are the proposals to reduce the impact of risks associated with artificial intelligence technologies?

Methodology:

The researcher in this study adopted the descriptive-analytical approach, given the nature of the subject. This was done with the aim of describing and analyzing the study's topic from various perspectives. To achieve the study's objectives, the focus was on determining the criminal Liability of designers of artificial intelligence technologies for errors in artificial intelligence.

Structure of study

1. Determining the Significance of Artificial Intelligence.

Section One: Definition of Artificial Intelligence.

Section Two: Significance of Artificial Intelligence.

2. Criminal Liability - Definition, Characteristics, and Elements.

Section One: Definition of Criminal Liability for Providers of Artificial Intelligence Technologies.

Section Two: Elements and Characteristics of Criminal Liability for Providers of Artificial Intelligence Technologies.

3. Reasons for Criminal Liability and Its Impacts.

Section One: Reasons for Criminal Liability for Providers of Artificial Intelligence Technologies.

Section Two: Impacts of Criminal Liability for Errors in Artificial Intelligence.

4. Artificial Intelligence and Determining Its Importance.

In recent times, technological advancements have become a focus of interest for nations. Countries have invested in this technological progress to enhance their various systems. Many nations have relied on artificial intelligence, and thus, any errors arising from artificial intelligence technologies pose a significant risk that must be addressed by laws and regulations. This is essential to protect the interests of the state and individuals within the society.

2. DETERMINING THE SIGNIFICANCE OF ARTIFICIAL INTELLIGENCE.

The term "artificial intelligence" emerged in the early 1950s in the nineteenth century. Scientists in general, and mathematicians and philosophers in particular, sought to explore the possibilities through which machines could be nourished to achieve a significant resemblance to the performance of the human mind. This pursuit of knowledge persisted throughout the ages, spanning the first, second, and third industrial revolutions, reaching its pinnacle with the advent of the fourth industrial revolution in 2011 (Abdulhadi, 2011: p. 34).

There are various definitions for artificial intelligence, all revolving around the machine's ability to perform human tasks that require human intelligence. Here, we will highlight some of the most important definitions.

Artificial intelligence is defined as "one of the branches of computer science concerned with how machines simulate human behaviour. It is the science of creating computer devices and programs capable of thinking in the same way as the human brain, learning as we learn, deciding as we decide, and acting as we act" (Abdulaziz, 2018, p. 99).

Artificial intelligence is defined as "a science that first explores the definition of human intelligence, identifies its dimensions, and then simulates some of its properties. It should be clarified that this field aims to compare human intellect, created by the Almighty with His power and greatness, with the machine, which is the creation of the creature. Moreover, this new science aims to understand mental processes through computational processes that enhance the computer's ability to solve complex problems" (Salah, 2018, p. 7).

In 1955, John McCarthy coined the term "artificial intelligence" at Dartmouth College in New Hampshire. McCarthy was one of the "founding fathers" of artificial intelligence, and his definition of artificial intelligence was the most common. McCarthy defined artificial intelligence as follows: "Artificial intelligence is a branch of computer science that deals with creating intelligent systems, also known as artificial intelligence. These systems are designed to be capable of performing tasks that require human intelligence, such as learning, inference, and decision-making." McCarthy's definition was highly ambitious, seeking to create intelligent systems that could perform any task that a human could. However, his definition was also broad enough to encompass a wide range of research in

the field of artificial intelligence. McCarthy's definition had a clear impact on the field and is still used today.

John McCarthy defined artificial intelligence as "the study and design of intelligent systems, also known as artificial intelligence or AI. These systems are designed to be capable of performing tasks that require human intelligence, such as learning, inference, and decision-making."

Other definitions include:

Steven Mitchell: "Artificial intelligence is a field that focuses on developing algorithms that can perform tasks believed to require human intelligence." John F. Mcdonald: "Artificial intelligence is the study and application of systems that appear intelligent or thoughtful."

Jack Douglas Norman: "Artificial intelligence is a field that focuses on creating devices capable of thinking, learning, and acting in ways similar to humans."

Each definition provides a perspective on the study and development of intelligent systems that can emulate human-like capabilities such as learning, reasoning, and decision-making.

The World Economic Forum defines artificial intelligence as "a set of technologies that allow devices to understand and interact with the world around them in a way that resembles humans." The Organization for Economic Cooperation and Development (OECD) defines artificial intelligence as "a multidisciplinary field focused on developing intelligent systems capable of performing tasks that require human intelligence." The European Union defines artificial intelligence as "a field that deals with creating systems capable of thinking, learning, and acting in ways similar to humans."

Artificial intelligence can be defined as "one of the branches of computer science concerned with simulating the behavior of humans “. It is the science of creating computer devices and programs capable of thinking in the same way as the human brain, learning as we learn, making decisions as we decide, and behaving as we behave" (Ibrahim, 2019/2020, p.34). Another definition states that artificial intelligence is "the branch of computer science through which computer programs are created to simulate human intelligence, enabling computers to perform some tasks instead of humans. These tasks require thinking, understanding, hearing, speaking, and moving in a logical and organized manner" (Alotaibi, 2005, p.17).

Various definitions converge on the idea that artificial intelligence is a field concerned with creating systems capable of performing tasks that typically require human intelligence.

a. The importance of artificial intelligence.

Artificial intelligence is considered a subfield of computer science that deals with creating intelligent systems, i.e., systems capable of performing tasks that require human intelligence. The continuous growth in technology and technological devices has led to the development of machines to assist in facilitating various activities (Al Maksu 2021: 753). Artificial intelligence includes a diverse range of technologies, such as machine learning, natural language processing, robotics, and computer vision.

Artificial intelligence holds significant importance as it can be used to improve our lives in various ways. It can enhance healthcare, education, transportation, manufacturing, and energy sectors. The technological and technical advancements in artificial intelligence have brought many benefits to various medical, industrial, and administrative fields. However, at the same time, it has become a threat to humanity and a violation of international humanitarian law when introduced into the field of military weapons. This has raised numerous complications and risks in the realm of armed conflicts (Ismail, 2022).

Here is an illustration of how artificial intelligence is used today in various fields:

Healthcare: AI can assist in medical diagnosis, drug discovery, and personalized treatment plans.

Education: AI can provide personalized learning experiences, adaptive tutoring, and educational content creation.

Transportation: AI is used in autonomous vehicles for navigation, traffic management, and safety.

Manufacturing: AI improves efficiency in production processes through automation, predictive maintenance, and quality control.

Energy: AI contributes to optimizing energy consumption, managing power grids, and enhancing renewable energy systems.

While artificial intelligence brings tremendous benefits, its deployment in military weaponry raises ethical concerns and potential violations of international law.

First: Healthcare Sector: Artificial intelligence can be used to improve disease diagnosis, develop new treatments, and assist patients in managing their health.

Second: Education Sector: Artificial intelligence can be utilized to personalize education for individual students, provide new educational tools, and help teachers teach more effectively.

Third: Transportation Sector: Artificial intelligence can enhance traffic safety, develop smart transportation systems, and reduce traffic congestion.

Fourth: Manufacturing Sector: Artificial intelligence can improve productivity, increase efficiency, and reduce errors in the manufacturing process.

Fifth: Energy Sector: Artificial intelligence can be used to enhance energy efficiency, develop renewable energy sources, and manage the power grid.

Sixth: Military Sector: Advanced countries have recently started developing and using modern technologies and artificial intelligence algorithms in the manufacturing of military weapons, leading to the emergence of new types of weapons known as autonomous weapons or lethal robots. International concerns have been raised about the use of such weapons (killer robots) that can kill, destroy, and carry out military operations on their own without human direction, posing challenges regarding their ability to distinguish between civilians and soldiers and comply with international humanitarian law (Ismail, 2022).

Artificial intelligence continues to evolve rapidly and is expected to have a significant impact on our lives in the coming years.

Seventh: E-commerce: The importance of artificial intelligence in e-commerce lies in AI software's ability to categorize and organize content, facilitating product discovery for shoppers based on various criteria such as size, color, shape, brand, etc. AI software improves visual intelligence capabilities by obtaining organized signals from uploaded images, assisting customers in successfully finding the desired product (Al Tawki, 2021: p.20).

The most important benefits of artificial intelligence:

1- Improving Efficiency and Productivity: Artificial intelligence can help us perform tasks more efficiently and productively, leading to increased income and an improved quality of life.

2- Solving Complex Problems: Artificial intelligence can assist us in solving complex problems that are challenging for humans, such as climate change and diseases.

3- Creating New Opportunities: Artificial intelligence can create new job opportunities, such as the development and maintenance of artificial intelligence systems.

The Risks of Artificial Intelligence:

1- Job Loss: Artificial intelligence can lead to job loss in certain sectors, as machines can perform tasks that were previously carried out by humans.

2- Bias: Artificial intelligence systems can exhibit bias, leading to discrimination against certain groups.

3- Misuse of AI for Harmful Purposes: Artificial intelligence can be misused for harmful purposes, such as the development of autonomous weapons or widespread surveillance systems.

4- Injustice: Artificial intelligence can result in discrimination against individuals or groups based on factors such as race, gender, religion, or other criteria. For example, machine learning algorithms used in online marketing systems may discriminate against individuals based on their search history or personal preferences.

5- Material Harm: Artificial intelligence can cause material harm, including injury or death. For instance, autonomous weapons could lead to unintended civilian casualties.

6- Security Threats: Artificial intelligence can be used in cyberattacks or other attacks on critical infrastructure. For example, AI can be employed to create viruses or other malware capable of penetrating sensitive systems.

7- Loss of Control: Artificial intelligence may eventually become so powerful that we lose control over it. For instance, if AI is developed to the point where it can make independent decisions, it could lead to unintended harm.

The Importance of Being Aware of Risks

It is important for governments and private institutions to be aware of the potential risks of artificial intelligence and to take steps to mitigate these risks. This can help ensure the safe and responsible use of artificial intelligence.

Steps that can be taken to mitigate risks include:

1- Establishing Appropriate Standards and Regulations: Governments can set standards and regulations to regulate the development and use of artificial intelligence. These standards can help ensure that artificial intelligence is safe and fair.

2- Promoting Transparency: Companies and other institutions can enhance transparency in how they use artificial intelligence. This can help increase public trust in this technology.

3- Education and Training: Governments and companies can provide education and training to individuals regarding the potential risks of artificial intelligence. This can help increase awareness of these risks and how to prepare for them.

Therefore, it is necessary that we are aware of the potential benefits and risks of artificial intelligence, and that we develop policies and laws to ensure that artificial intelligence is used in a legal manner that benefits humans and reduces risks.

The Most Important Types of Robots and Their Uses:

1- Operational Robots: These robots are used in hazardous operations and are remotely controlled. They are employed for tasks such as searching for minerals.

2- Industrial Robots: These robots are utilized to efficiently perform specific tasks faster than humans, aiding in enhancing production levels and efficiency through process automation. This reduces the time needed for quality control and increases overall production (Sakr, 2021: p. 56).

3- Educational Robots: These robots find application in the educational field, especially in teaching children and individuals with special needs. In California, robots have been used in education to assist teachers in teaching children singing and pronunciation.

4- Medical Robots: The use of robots in the medical sector represents a significant leap, creating a broad scope for benefiting from these technologies. They were introduced to hospitals in the year 2000 with approval from the U.S. Food and Drug Administration, where they have been used to assist in performing or conducting surgical procedures (John, 2015: p. 65).

Robots used in the field of justice and law enforcement have been employed in crime prevention. They have assisted law enforcement in detecting criminal hideouts, inspecting explosive-laden vehicles, and organizing traffic. Notably, the United Arab Emirates officially introduced the first police robot named "Promobot," equipped with facial recognition technology to identify and report wanted individuals. Additionally, it can livestream videos directly to the Abu Dhabi Police control center (see: "Abu Dhabi Police Robot," published on July 16, 2021, accessed on March 25, 2023, at 15:34, available at: https://alsyaaq.com/Abu-Dhabi-Police-Robot).

Military robots have been utilized in war zones with the aim of reducing human casualties. They have been used in tasks such as mine clearance, survey operations, surveillance, and night imaging.

The United Arab Emirates is among the first Arab and global countries to show special interest in artificial intelligence. It has established a new ministry called the Ministry of Artificial Intelligence, working to achieve the UAE's artificial intelligence strategy and integrate it into various sectors (Ibrahim, 2019: p. 19).

3. CRIMINAL LIABILITY: DEFINITION, CHARACTERISTICS, AND ELEMENTS.

With the advancement of artificial intelligence, it has become possible to create systems capable of performing tasks that previously required human intelligence. AI applications are now used in various fields, including healthcare, education, manufacturing, and transportation, as mentioned earlier. However, the use of artificial intelligence comes with many potential risks, and AI applications can cause harm to individuals and property if they fail to function as intended. This raises questions about the criminal liability of providers of AI technologies if their AI applications cause harm.

Artificial intelligence poses a new challenge to the legal system regarding the applicability of existing legal rules to address various legal issues that AI may raise, such as contractual or tort liability, civil liability, and criminal liability.

It is worth mentioning that the legal adaptation of criminal liability in the case of AI errors has become crucial due to technological advancements. Criminal liability has legal consequences resulting from a crime as recognized by the law, and thus, the actor bears the consequences imposed by these legal rules. Since AI technologies sometimes assume the involvement of various actors, including the producing company, the owning user, and the beneficiary, the legal Liability of these entities is influenced by the unique nature of artificial intelligence. It is necessary to develop traditional general rules of criminal law to align with modern technological advancements and establish deterrent rules to mitigate the risks associated with artificial intelligence.

A. Definition of criminal liability of providers of artificial intelligence technologies

The role of the legislator in regulating the practice of artificial intelligence techniques

Legislation imposes certain restrictions on the use or handling of prohibited or hazardous materials. For example, U.S. law states that "whoever possesses or causes to be present a firearm or other dangerous weapon in a federal facility, or attempts to do so, shall be fined under this title or imprisoned not more than one year, or both. United States Code, Title 18,

Part I, Chapter 44, Section 930 - Possession of firearms and dangerous weapons in Federal facilities."

Most countries have stricter rules. For instance, Chinese criminal law stipulates that "whoever manufactures, trades, transports, mails, or stores any weapons, ammunition, or explosives shall be sentenced to fixed-term imprisonment of not less than three years and not more than ten years." Similar approaches are found in Russian criminal law, which punishes the theft or possession of firearms with imprisonment ranging from three to seven years (Article 226, Criminal Code of the Russian Federation No. 63-FZ dated June 13, 1996).

When using artificial intelligence, there are expected risks, and regulations are necessary for the possession, use, or distribution of such AI technologies. When AI technology is integrated with hazardous or prohibited substances, current legislation, which already has rules related to regulating technology use, should be applied. High-risk areas must comply with the conditions set by these regulations. The integration of artificial intelligence into various fields makes them inherently risky, and specific regulations are essential.

The use of artificial intelligence technologies makes seemingly simple things more dangerous. For instance, an ordinary car with an AI-driven system can be considered a dangerous weapon when used for terrorist purposes. Fully autonomous vehicles provide criminals with additional advantages, such as time efficiency and lower costs for preparing and executing crimes (Celli, Elia Bruni, 2014, p.110).

Currently, there is no unified legal framework for criminal liability for AI applications. Laws vary from country to country and may also depend on the type of application used. In general, criminal liability for AI applications relies on the general principles of criminal Liability. In most countries, individuals or companies are responsible for damages if they are responsible for the harm. Our research focuses on defining the criminal liability of technology providers as those responsible for application errors.

There are numerous crimes related to AI technologies, and new ones emerge daily, whether in the real or virtual world. Examples of crimes using AI technologies are abundant in the real world, such as road accidents involving AI-driven machines like robots, drones, ships, and others.

A person or company can be liable for damage if:

1- They were aware of the potential danger of harm and did not make reasonable efforts to mitigate the risk.

2- They had the ability to control the risk but failed to do so.

3- They caused harm through their negligence or mistake.

Here are some examples of situations where providers of AI technologies may face criminal liability:

- If a self-driving car causes an accident, the car manufacturer, or the company responsible for the system may be liable for the damage.

- If an artificial intelligence tool used in medical diagnosis results in an incorrect diagnosis, the doctor or the company manufacturing the system may be responsible for the harm.

- If an artificial intelligence tool used in marketing leads to an unintended purchase decision, the marketer or the company manufacturing the system may be responsible for the damage.

These are just examples, and actual criminal liability may vary depending on specific circumstances, the nature of the crime, and its conditions.

One of the most notable criminal cases involving self-driving cars occurred in March 2018 when an autonomous vehicle owned by UBER collided with a woman named "Herzberg," resulting in her death due to injuries. This incident marked the first recorded pedestrian fatality caused by a self-driving car. The accident happened late in the evening on March 18, 2018, as the woman was crossing Mill Avenue outside of the designated pedestrian crosswalk near the highway. She was pushing a bicycle loaded with shopping bags and had crossed at least two traffic lanes when she was struck by the self-driving Uber vehicle (Volvo XC90 prototype). The Liability for this incident would fall on the providers of the technology that contributed to the fatality.

Examples of crimes of artificial intelligence technologies in the virtual world:

This is a crime of violating privacy rights. Social media platforms, such as Facebook, use artificial intelligence algorithms to achieve specific goals using cookies. These goals include confirming the user's identity, identifying preferences, determining their location, analyzing their activities, and other information that can be gleaned from these files.

Violating user privacy through Facebook programs that rely on artificial intelligence algorithms involves identifying the user's interests through their interactions with photos or posts and their following of specific products. This information is used to display ads that align with their interests and to show customized content. Although this is usually done with the user's consent, it can be considered a privacy violation if the information is used in unauthorized ways or for unlawful purposes (Al-Asar, 2015: p. 42).

These examples illustrate how artificial intelligence technologies in the virtual world can be exploited for spying on users and violating their privacy. Strict laws and policies regarding the protection of personal data and privacy in the virtual world protect these rights, and companies and organizations implement robust security measures to safeguard users and preserve their privacy.

Criminal liability in crimes using artificial intelligence technology.

In Egyptian legislation, Article 95 of the Egyptian Constitution of 2014 states: “Punishment is personal, and there is no crime or punishment except by law, and no punishment is imposed except by a judicial judgment, and no punishment is imposed except for subsequent acts to the effective date of the law.” Additionally, Article 5 of the Egyptian Penal Code No. 58 of 1937, with its latest amendments in 2018, stipulates: “Punishment for crimes is in accordance with the law in force at the time of their commission.”

Criminal Liability, in general, is the criminal's commitment to bear the consequences of their actions if the elements of the crime are present (Sourour, 2002: p. 197). Traditionally, the crime, according to the traditional concept, has two material elements: the physical aspect represented by the actions of the perpetrator and the resulting consequences, and the personal aspect represented by what happens in the mind of the perpetrator, i.e., the knowledge and full intention. This is referred to as the moral element. Criminal jurisprudence adds a third element, which is the legal element, meaning the illegitimate nature of the act committed by the perpetrator. Thus, crime and criminal Liability only exist when both the material and moral elements are present, and criminal Liability can only be attributed to a natural person because they are the only ones qualified for it.

Crimes involving the use of artificial intelligence technology are a complex issue. There are four parties involved in the criminal Liability for these types of crimes. The first party is the producer of artificial intelligence technology, the second is the owner of the artificial intelligence technology, the third is the artificial intelligence technology itself, and the fourth is the external party that breaches the technology and causes harm (El Desouki, 2022: pp. 1132-121).

Types of responsibilities that can cause industrial errors, including:

1. Direct Criminal Liability: This involves holding the individual or entity that owns or controls the artificial intelligence system accountable for the damages caused by the system. This includes situations where the system is designed or programmed improperly, or if it is operated or used incorrectly. Criminal liability can be addressed within the Liability of the technology owner.

The Liability of the technology owner and the technology user

First, it is necessary to identify the source of the error, whether it resulted from a programming mistake or improper use of the technology, or a failure to adhere to global standards for the product, which constitutes the criminal liability of the technology provider. In the case of a programming error, it is important to distinguish between intentional actions and unintentional mistakes when determining criminal liability.

The owner or user who controls artificial intelligence technologies is expected to be responsible for the misuse of the program, leading to a punishable crime. In this context, several possibilities arise, such as the crime occurring solely due to the owner's (user's) behavior. If it were not for this behavior, the crime would not have occurred, and in this case, the criminal Liability falls entirely on the owner. An example of this is disabling the automatic control in a self-driving car and keeping control of the vehicle, such as ignoring voice commands from the artificial intelligence program. If the owner receives a warning from the program to avoid an accident and fails to comply, the criminal Liability lies solely with the owner.

The second possibility is the crime occurring because of the owner's behavior in collaboration with other parties, such as the manufacturer, the artificial intelligence technology itself, or an external party. For example, the owner of a car changing the operational commands in a self-driving car with the assistance of a specialist in this field to exploit it for committing a crime and disclaiming personal Liability while attributing it deliberately to the car and its manufacturer. In this case, criminal Liability is shared according to Article 40 of the Egyptian Penal Code No. 58 of 1937, which addresses the different parties involved in the crime.

2. Indirect Criminal Liability: This involves holding the person or organization that benefits from an artificial intelligence system accountable for the damages caused by the system if it suffers from a design or programming flaw, or if it is operated or used incorrectly. In this case, the user of the technology cannot be held responsible for the errors produced by the system, and the full Liability falls on the programmer for those mistakes.

3. Criminal Liability for Negligence: This entails holding the person or organization accountable for failing to take necessary measures to prevent harm, despite being aware of the possibility of its occurrence. This can be addressed through the Liability of the producer of artificial intelligence technology, where the producer failed to take adequate measures to prevent potential harm.

The Liability of the producer of artificial intelligence technology and the liability of the external party who breached the technology and caused the attack.

In the case of another party exploiting vulnerabilities or programming errors in artificial intelligence technology to commit a crime, the full criminal Liability for committing the crime lies with that party. This situation does not pose any problem, as there is no separate free will for artificial intelligence; it is a result of the programmed code created by the programmer, which may not be sufficient to anticipate all possibilities.

The liability may also extend to the improper actions of the owner or the intervention of an external party to hack the machine and use it as a tool in committing a crime. For example, someone disabling the boundaries set by the AI producer, making it disconnected from the producer, granting full freedom in actions without the restrictions designed to prevent criminal activities.

It's worth noting that modern judicial applications of robots as artificial intelligence systems have introduced the term "electronic deputy." This term has been used by the U.S. judiciary in 2016 to refer to independent computer programs. The French Court of Cassation also supported this view in 2018, stating that an email response robot is simply an "informational computer program without being granted any representative capacity on behalf of its operator; it is merely a means contributing to the flow of data in the digital space in the service of public needs.

Therefore, some legal scholars in the Arab jurisprudence have suggested treating electronic systems as human entities. Some believe that granting legal personality (non-distinct moral personality) to artificial intelligence systems is expected to qualify them for financial liability and burden them with obligations arising from their unlawful actions.

Can artificial intelligence technology be subject to criminal liability?

A scenario could be envisioned where technology itself becomes the perpetrator of the crime, occurring without any programming error from the producer or intervention from any other party. This could happen through advanced techniques that enable artificial intelligence to think and make autonomous decisions for which it alone is responsible, without external influence. A real-life example of this scenario is smartphone users engaging in criminal activities.

However, legally, as mentioned earlier, technology cannot be subject to Liability due to the absence of the conditions that make it a subject of liability.

Legal challenges related to criminal liability for artificial intelligence applications:

1. Difficulty in determining Liability: It may not always be clear who is responsible. For example, if a robot causes an accident, the owner of the robot may be responsible for the damage. However, in other cases, determining Liability may be challenging. For instance, if an artificial intelligence application causes a medical error, the doctor, hospital, or the company manufacturing the application may be responsible for the damages.

2. Difficulty in determining harm: In some cases, harm may be clear and tangible. For example, if an artificial intelligence application causes someone's injury, it may be easy to determine the harm. However, in other cases, the harm may be less evident. For instance, if an artificial intelligence application leads to someone losing their job, it may be challenging to determine the harm.

3. Difficulty in proving liability: It can be challenging to prove criminal liability for artificial intelligence errors due to the complex nature of these errors.

4. Negative impact on innovation: Strict application of criminal liability can potentially hinder innovation in the field of artificial intelligence.

5. Difficulty in proving intentional wrongdoing.

The crime may have occurred due to a programming error by the developer of the artificial intelligence program. The programmer may inadvertently introduce errors that lead to criminal activities, making them criminally liable (Al-Awsi, 2014: p. 26). It is essential to differentiate whether the behavior was intentional or not to determine the culpability and the corresponding punishment, which may be challenging to prove.

French jurist Bourcier argued that the law should protect individuals from artificial intelligence systems and robots. Humans should be considered guardians of robots and artificial intelligence systems, holding them responsible for any harm caused by their assumed operation without the need to prove negligence (Bourcier, 2013, n°49 p. 859). This perspective aligns with a ruling from the French Court of Cassation in 2018, stating that email response robots are merely informational computer programs without any legal representation on behalf of their operators; they are tools that contribute to inputting data into the digital space.

Penalties for artificial intelligence crimes

According to the principle of legality, there is no crime or punishment without a legal text. Criminal behavior cannot be criminalized, and a person cannot be punished for an act unless it is deemed criminal by the law. Punishment, by its nature, is painful and must be specific in terms of its quantity and manner. Therefore, when a judge pronounces a sentence, they must specify its type and amount.

Keeping legislation up to date with advancements in artificial intelligence is crucial. New types of crimes related to AI technology emerge, requiring legislative intervention to criminalize them and establish deterrent penalties. The Liability in AI technology-related crimes involves the producer, owner, the AI itself, and external parties, such as users or those affected by the technology. Each case needs careful examination to determine the true culprit amid the complexity introduced by artificial intelligence.

Criminal Liability for the manufacturer of artificial intelligence is a complex issue. The legislator, in Egyptian law and many existing legislations, adheres to the traditional concept requiring a person to have certain legal capacities to be criminally responsible. This legal capacity consists of elements forming the basis of criminal liability: awareness and will. Willpower is considered an element of legal capacity for criminal Liability.

There are four parties associated with criminal Liability in these types of crimes: the manufacturer, the owner, the AI itself, and an external party, which could be a user, or someone adversely affected by the AI. Thus, it is necessary to study each crime carefully to identify the true culprit amid the confusion introduced by artificial intelligence.

In the context of crimes committed by robots, the issue of how to investigate, question, search, examine crime scenes, collect robot fingerprints, and analyze them raises many questions. Additionally, determining the criminal Liability of the robot and whether it possesses intent, and knowledge of the crime are challenging issues. The rules of criminal contribution in robot crimes, defending the robot, mitigating and aggravating circumstances, legal excuses, trial and final investigation procedures, executing the punishment, and whether the robot will execute the punishment itself or if other people will be subjected to execution—all these questions are difficult to answer within existing criminal legislations designed for human beings rather than artificial entities (Daashan, 2019: p. 25).

b. Possible solutions to legal challenges related to the use of artificial intelligence.

1- Developing a unified legal framework for criminal liability regarding artificial intelligence applications. This will help clearly determine the party responsible for damages and facilitate compensation for those who have suffered harm.

2- Developing new legal systems that reflect the unique nature of artificial intelligence applications. For example, there may be a need for laws requiring developers of AI applications to take steps to prevent harm.

The criminal Liability of providers of AI technologies is a complex issue that requires further study and development. It is essential to establish policies and laws to ensure the responsible and ethical use of artificial intelligence.

Elements and characteristics of criminal liability for providers of artificial intelligence technologies

The criminal liability of providers of artificial intelligence technologies is based on general principles of criminal Liability. In most countries, individuals or companies are held responsible for damages if they are found to be accountable for the harm.

A person or company can be liable for damage if:

1- They were aware of the potential danger of harm and did not make reasonable efforts to reduce the risk.

2- They had the ability to control the risk and did not do so.

3- They caused harm through their negligence or error.

4- Based on these principles, the elements, and characteristics of criminal liability for providers of artificial intelligence technologies can be determined as follows:

Elements of criminal Liability:

Wrongful conduct: There must be wrongful conduct on the part of the provider of artificial intelligence technology, such as designing an unsafe system or failing to take steps to prevent harm Harm: Wrongful conduct must result in harm to individuals or property.

Causation: Wrongful conduct must be a direct or indirect cause of the harm.

Characteristics of Criminal Liability:

Personal Liability: The provider of artificial intelligence technology personally bears criminal Liability for the damage caused by their AI technology.

Objective Liability: The provider of artificial intelligence technology does not have to intend to cause harm.

Liability for the actions of others: The provider of artificial intelligence technology may be held responsible for the actions of others, such as users or employees, if they are responsible for them.

4. Causes and effects of criminal liability.

Reasons for criminal liability are the conditions that must be met by an individual to be held accountable for a certain crime. These reasons may vary from one country to another. There are some challenges that arise when applying these reasons to artificial intelligence crimes, due to the unique nature of artificial intelligence systems.

4. REASONS FOR CRIMINAL LIABILITY FOR PROVIDERS OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES

The criminal liability of providers of artificial intelligence technologies is based on general principles of criminal Liability. In most countries, individuals or companies are held responsible for damages if they are responsible for the harm.

In order for a person to bear criminal Liability, the following conditions must be met:

1. Legal Capacity: The person must be a legal adult and mentally competent, capable of distinguishing between right and wrong.

2. Commission of a Crime: The person must have committed an act or negligence that constitutes a crime, meaning the action or negligence violated a legally binding provision.

3. Absence of Excuse or Obstacle: The act or negligence should have occurred without a valid excuse or any of the recognized obstacles to criminal Liability. These obstacles include insanity, minority, coercion, necessity, or legitimate self-defense.

If criminal Liability is established for an individual, the law imposes a specific penalty, which can be a criminal penalty (such as imprisonment, fines, or capital punishment) or a civil penalty (such as compensation for damages, injunctions, or restraining orders). The nature of penalties varies from one country to another based on their legal systems.

I. Criminal Liability aims to achieve a set of goals, including:

1. Deterring people from committing crime.

2. Protecting society from crime.

3. Achieving justice in society.

Criminal Liability is considered one of the most important means of protecting society from crime, playing a fundamental role in maintaining public order and social stability.

A person or company may be held responsible for damages if:

1. They were aware of the potential danger of harm and did not make reasonable efforts to reduce the risk.

2. They could control the risk and did not do so.

3. They caused harm through negligence or error.

Based on these principles, the causes of criminal Liability for providers of artificial intelligence technologies can be determined as follows: -

A. Design of an Unsafe System: A provider of artificial intelligence technology may be criminally liable if they design an unsafe system that causes harm. For example, the maker of a self-driving car could face criminal charges if their car causes an accident due to a flaw in the system design.

B. Failure to Take Steps to Prevent Harm: The provider of artificial intelligence technology may be criminally responsible if they fail to take steps to prevent harm. For instance, a robot developer could be criminally liable if the robot causes an injury because they did not take steps to mitigate risks.

C. Failure to Disclose Defects or Errors: The provider of artificial intelligence technology may be criminally responsible if they do not disclose defects or errors in their system. For example, the maker of an artificial intelligence tool could be criminally liable if they fail to disclose that the tool could produce incorrect results.

D. Liability for the Actions of Others: The provider of artificial intelligence technology may be criminally responsible for the actions of others, such as users or employees, if they are responsible for them. For instance, the owner of a self-driving car company could be criminally responsible for the actions of the automated car's driver.

II. Triggers of criminal liability for artificial intelligence errors

It has become possible to use artificial intelligence technologies in a wide range of fields, including areas that may lead to harm or injuries, such as autonomous driving, medicine, and manufacturing. As a result, questions have arisen about the possibility of holding individuals or entities accountable for the damage caused by artificial intelligence systems. The criminal liability for artificial intelligence errors can have both positive and negative effects on society, which we will elaborate on, along with proposing solutions to these effects.

Positive effects

Positive effects of criminal liability for AI errors include:

1. Encouraging the development of safe artificial intelligence systems: Criminal liability can assist providers of artificial intelligence technologies in developing safer systems by encouraging the implementation of measures to reduce risks.

2. Protecting individuals from harm: Criminal liability can help protect individuals from the harm caused by unsafe artificial intelligence systems.

3. Enhancing trust in artificial intelligence systems: Criminal liability can contribute to enhancing trust in artificial intelligence systems by demonstrating that providers of these technologies are responsible for their actions.

Negative effects

The negative consequences of criminal liability for AI errors include:

1. Increased cost of developing and using artificial intelligence systems: Criminal liability can lead to an increase in the cost of developing and using artificial intelligence systems, as providers of these technologies must take additional steps to reduce risks.

2. Impact on innovation: Criminal liability can affect innovation in the field of artificial intelligence, as providers of these technologies may hesitate to develop new systems if they believe they could be held responsible for any resulting harm.

Suggested solutions:

There are several proposed solutions to mitigate the negative effects of criminal liability for artificial intelligence errors. One solution is to develop a unified legal framework for criminal liability for artificial intelligence applications.

1. This will help ensure consistent application of criminal liability, reducing unforeseen risks.

2. Another solution is to develop specialized insurance systems for criminal liability related to artificial intelligence.

3. This will assist providers of artificial intelligence technologies in bearing the financial risks of criminal liability, potentially leading to increased investment in the field of artificial intelligence.

Criminal liability for artificial intelligence errors is a complex issue with both positive and negative impacts on society. It is important to develop solutions that balance the need to protect individuals from harm with the need to enhance innovation in the field of artificial intelligence.

Countries' trends towards artificial intelligence:

Legislative countries are increasingly moving towards developing a legal framework for artificial intelligence. This framework aims to ensure responsible and ethical use of artificial intelligence while protecting human rights and democratic values. Countries vary in how they address the use of artificial intelligence technologies, and restrictions should be derived from a common legal policy. In countries that value human rights, it is logical for the legislature to severely limit the intervention of artificial intelligence technologies in the personal lives of citizens and establish criminal liability for the slightest violation of personal interests. In other countries, efforts may focus on artificial intelligence technologies that could harm people, society, or the government.

Some issues related to the intellectual capabilities of artificial intelligence systems go beyond the scope of modern ethics. For example, China announced that it would use advanced programs "to predict crimes and social disturbances before they occur."

On June 29, 2017, the British House of Lords appointed a committee specializing in artificial intelligence technologies to investigate the economic, ethical, and social impacts of developments in artificial intelligence systems. They issued a report on this in April 2018. The United States held a conference in Naham in 2019 regarding the future applications and ethics of artificial intelligence.

On May 29, 2019, the Legislative Council of the U.S. state of Illinois passed a law regarding "Conducting Interviews Using Artificial Intelligence in Hiring Processes." The governor signed the bill on August 9, 2019, and the law came into effect in early January 2020. Among the provisions of the law is the required consent of the job applicant for the

use of artificial intelligence. The law also imposes a ban on sharing video clips of the applicant outside the hiring process, limiting the use of artificial intelligence to analyze interview footage only.

It is evident from the above that applying the law against unregulated trading of dangerous artificial intelligence systems is highly critical when dealing with artificial intelligence (Shaheed, Bin Turki, 2018: p. 109).

1. Countries' legislative approaches towards artificial intelligence focus on a few key issues, including:

2. Criminal Liability for Artificial Intelligence Errors: Countries seek to determine the party responsible for damages caused by artificial intelligence systems.

3. Safety of Artificial Intelligence Systems: Countries aim to develop safe and efficient artificial intelligence systems.

4. Transparency and Disclosure: Countries strive to ensure transparency and disclosure regarding the functioning of artificial intelligence systems.

5. Justice and Fairness: Countries work towards ensuring that artificial intelligence systems are used in a fair and unbiased manner.

6. Diversity: Countries aim to ensure that the use of artificial intelligence systems reflects diversity within society.

Here are some examples of countries' legislative trends towards artificial intelligence:

1. In the United States, Congress passed the Artificial Intelligence Safety Reform Act, requiring the government to develop safety guidelines for artificial intelligence systems used in areas such as national security and healthcare. The U.S. enacted the Future of Artificial Intelligence Act in December 2017, the first federal law centered around artificial intelligence. This law establishes a committee to study all aspects of artificial intelligence, make decisions, and assess the impact of AI systems on the workforce in the United States. Additionally, the Legislative Council of the state of Illinois passed a law on May 29, 2019, regarding video conferencing in recruitment processes. The law came into effect on January 1, 2020.

2. In the European Union, European Commissioner for Innovation and Research, Janusz Bogdan, is working on developing a legal framework for criminal liability for artificial intelligence errors. On November 14, 2018, the EU issued complementary texts to the General European Regulation on the Protection of Personal Data, providing a framework for the free flow of non-personal data in the EU. This regulation emphasizes the principle of freedom of movement for non-personal data within the EU without restriction.

3. The British House of Lords appointed a select committee on June 29, 2017, to examine the economic, ethical, and social impacts of developments in artificial intelligence. The committee released its first report in April 2018.

4. The Chinese government heavily invests in research on the safety of artificial intelligence.

5. In Egypt, the Prime Minister issued a decision (No. 2889 of 2019) to establish a National Council for Artificial Intelligence under the Cabinet. This council is responsible for developing the national strategy for artificial intelligence, overseeing its implementation, and updating it in line with international developments in the field.

6. These initiatives aim to ensure responsible and ethical use of artificial intelligence, protecting human rights and democratic values. However, these efforts are still in their early stages, and it is likely that countries will continue to develop new laws and regulations for artificial intelligence in the coming years.

Countries confront AI bugs through a variety of measures, including:

1. Establishing a Legal Framework for Criminal Liability for Artificial Intelligence Errors: Many countries are working on developing a legal framework for criminal liability for artificial intelligence errors. This will help determine who will be responsible for the damages caused by artificial intelligence systems, making it easier for individuals who have suffered harm to obtain compensation.

2. Developing Ethical Standards and Practices for Artificial Intelligence: Many countries are also working on developing ethical standards and practices for artificial intelligence. This will help ensure the responsible and ethical use of artificial intelligence.

3. Funding research into AI safety: Many countries are investing in research into AI safety. This will help develop safer AI systems.

Here are some specific examples of measures taken by countries to address artificial intelligence errors:

In the United States, Congress passed the Artificial Intelligence Safety Reform Act, requiring the government to develop safety guidelines for artificial intelligence systems used in areas such as national security and healthcare.

In the European Union, the European Commissioner for Innovation and Research, Janusz Wojciechowski, is working on developing a legal framework for criminal liability for artificial intelligence errors.

In China, the Chinese government is heavily investing in research in the field of artificial intelligence safety.

It is important for all countries to collaborate with each other to develop global solutions to address artificial intelligence errors. As artificial intelligence spreads rapidly worldwide, there should be a unified legal and ethical framework to protect individuals from harm.

International cooperation in the field of addressing artificial intelligence risks:

Artificial intelligence errors are a global problem, and it is important for countries to collaborate with each other to develop global solutions to address them.

Here are the most important AI treaties:

1. UNESCO Guidelines for Artificial Intelligence: This declaration was issued in 2020 and includes guidelines for artificial intelligence based on human values. The guidelines focus on issues such as transparency, accountability, justice, fairness, and diversity.

2. Paris Declaration on Artificial Intelligence: This declaration was issued in 2019 and includes a joint statement from 116 countries on the importance of responsible use of artificial intelligence. The declaration calls for the development of artificial intelligence in a way that respects human rights and democratic values.

3. Budapest Declaration on Artificial Intelligence: This declaration was issued in 2018 and includes guiding principles for artificial intelligence focusing on issues such as safety, fairness, and Liability. The declaration calls for the development of artificial intelligence in a way that serves the public good.

In addition to these treaties, there are several international organizations working on developing ethical standards and practices for artificial intelligence. Among these organizations:

1. United Nations: The United Nations has several programs and agencies working on artificial intelligence issues, including the UN High Commissioner for Human Rights and the United Nations Educational, Scientific and Cultural Organization (UNESCO).

2. European Union: The European Union launched the "Responsible AI" initiative aimed at developing a legal and ethical framework for artificial intelligence in Europe.

3. United States: The United States is engaging in discussions about developing laws for artificial intelligence.

4. These treaties and international organizations play a crucial role in shaping the future of artificial intelligence. By developing guiding principles and ethical standards, these institutions help ensure the responsible and ethical use of artificial intelligence.

Here are some international mechanisms that can be used to address AI errors:

1. International Treaties: Countries can negotiate international treaties to define criminal Liability for artificial intelligence errors. This will help ensure the consistent application of criminal Liability worldwide.

2. Collaboration between International Organizations: International organizations, such as the United Nations and the European Union, can play a role in coordinating international efforts to address artificial intelligence errors. These organizations can hold conferences and seminars to discuss issues related to artificial intelligence and encourage countries to collaborate in areas such as developing ethical standards and practices for artificial intelligence.

3. Public Participation: Individuals and non-governmental organizations can play a role in pressuring governments to develop global policies to address artificial intelligence errors. Individuals and non-governmental organizations can also participate in public discussions on artificial intelligence to ensure that responsive solutions are developed to meet human needs and values.

1. Here are some specific examples of international mechanisms used to address artificial intelligence errors:

2. In 2019, the United Nations Human Rights Council issued a resolution urging countries to develop ethical standards and practices for artificial intelligence.

3. In 2020, the European Union launched the "Responsible AI" initiative aimed at developing a legal and ethical framework for artificial intelligence in Europe.

4. In 2021, the United Nations held an international conference on artificial intelligence to discuss issues related to artificial intelligence.

5. International efforts to address artificial intelligence errors are still in their early stages, but it is important for countries to start cooperating with each other to develop global solutions.

Results

1. The criminal Liability for artificial intelligence errors is a complex issue that requires further study and continuous research to keep up with the rapid and astonishing developments in these rapidly evolving technologies. It is important to develop effective solutions to achieve a balance between protecting society from harm and encouraging innovation in the field of artificial intelligence. Recognition of the legal and moral personality of artificial intelligence can be acknowledged, and through it, Liability can be assigned.

2. The difficulty of determining criminal Liability for artificial intelligence errors involves legal challenges related to identifying criminal Liability for artificial intelligence errors, requiring urgent legislative intervention to mitigate the risks of not assigning Liability.

3. The variability of criminal Liability from one case to another, and the difficulty of establishing fixed controls for such types of crimes, are due to the rapid technological advancements in artificial intelligence.

Recommendations:

There are a number of proposed solutions to the challenges facing criminal liability for artificial intelligence errors, including:

1. Developing Specific Legal Standards and Regulations for AI Responsibilities: This involves creating clear legal standards and regulations for artificial intelligence (AI) responsibilities to clearly identify the party responsible for AI errors, making it easier for affected individuals to obtain compensation.

2. Developing Technological Tools for Identifying and Analysing AI Errors: This aims to facilitate proving criminal Liability for these errors by developing technological tools to identify and analyse AI errors involving different parties.

3. Developing Effective Compensation Mechanisms for Victims: This is essential to mitigate the negative impacts of criminal Liability on innovation. Effective compensation mechanisms are needed to address the negative effects of criminal Liability on innovation.

4. Establishing a Legal and Ethical Framework for AI: Most researchers agree that there is a need for a legal and ethical framework for AI to ensure its responsible and ethical use.

5. Compelling AI Technology Providers to be Transparent: This involves requiring transparency and disclosure from AI technology providers about how AI systems work. Transparency and disclosure about the functioning of AI systems are crucial in determining criminal Liability and involving experts in the field to resolve issues before the judiciary.

6. The Need for a Legal Framework Ensuring Justice and Fairness in AI Use: AI systems must be used fairly and impartially, and the Liability of different parties for such technologies must be defined. This necessitates the development of a legal framework that ensures justice and fairness in the use of AI systems.

7. The Necessity of International Cooperation and Agreement: Countries and international organizations need to collaborate to establish an international charter aimed at protecting individuals from errors in such technologies.

5. CONCLUSION:

Despite the significant importance of artificial intelligence (AI) technologies and their remarkable progress in enhancing performance and development, AI systems have become more complex, and their capabilities are growing rapidly. This makes it difficult to determine Liability for the damages caused by AI systems, requiring continuous legislative development and comprehensive legal texts covering all anticipated crimes through AI technologies.

Countries must come together to establish international treaties that provide a legal framework for these crimes and ensure the punishment of perpetrators. The rapid progress of AI systems must be accompanied by legislative development to establish principles and laws regulating the operation of AI systems. Today's reliance on AI technologies in various fields highlights the urgent need for legislative regulation of the actions of these systems. Scientific institutions working in the field of AI systems have played a role by issuing ethical principles, which have contributed to assisting legislators and pushing legislative development forward. This is aimed at addressing the danger posed by the operation of AI systems on humanity and mitigating it in a way that ensures their use without risks that threaten humanity.

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