ESTABLISHING RISK-BASED LIABILITY FOR THE USE OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES

DR. BELLOUT SAMAH
Brothers Mentouri University - Constantine 1, Algeria
Corresponding author : Samah.bellout@gmail.com
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Abstract
Artificial intelligence (AI) represents the latest advancement in cognitive technology, extending its influence across diverse fields. Its application is not restricted to peaceful purposes but also includes significant roles in enhancing military technologies. These technologies have led to the development of advanced weapons with immense destructive capabilities. However, the integration of AI into such domains has introduced several problems and challenges. Among these are disparities in access to AI advancements among nations and the escalation of electronic warfare. These issues pose significant risks to the global community, disrupt international relations, and threaten public order on a global scale.
In response, international measures have sought to impose stricter regulations to reorganize international relations. These measures aim to establish accountability for any international entity responsible for causing harm. Traditional approaches to international liability, which rely on proving fault, are increasingly inadequate in the face of rapid economic, industrial, and technological progress. Proving fault has become difficult, if not impossible, under these conditions. Therefore, liability for damages caused by the use of AI technologies must be based on the principle of risk. This means that demonstrating the occurrence of harm is sufficient to establish responsibility, regardless of fault, even when the activity complies with the norms of public international law.
Keywords*: artificial intelligence, international liability, risk theory, public international law, establishing liability.*

INTRODUCTION

This era is often referred to as the "digital revolution," with artificial intelligence (AI) being one of its most significant achievements. This revolution has introduced groundbreaking applications in various sectors such as education, healthcare, security, trade, and the environment. The transition to the "age of the machine" marks a defining milestone in human history, fostering development and prosperity for many nations. AI has become a crucial determinant of a state's power, complementing its military and cultural strength. It serves as both a driver of innovation and a means to accelerate technological progress.

However, alongside its benefits, AI introduces numerous ethical, social, and legal challenges. Among the most critical is the technological disparity it creates, granting an advantage to nations possessing advanced AI capabilities while marginalizing others. This imbalance results in monopolization of global markets by developed countries, exacerbating inequalities and intensifying electronic warfare.

One notable application of AI is in lethal autonomous weapons systems, which represent a new generation of weaponry. These systems can identify and engage targets independently using algorithmic data, operating without human intervention. While these weapons are powerful, their use must comply with international humanitarian law governing armed conflict. The intersection of AI and military technology has raised legal and ethical concerns due to the autonomous and sophisticated nature of these systems. Unlike traditional tools, they operate based on programmed learning and decision-making, posing unique challenges previously unseen. Despite their advantages, these technologies bring potential risks and harms to the international community.

The issues and challenges arising from AI usage disrupt global public order and threaten the stability of international relations. Consequently, strict application of public international law has become necessary to regulate these relations and establish liability for parties causing harm. Traditional fault-based liability mechanisms are no longer adequate in addressing damages from AI technologies, as proving fault has become increasingly difficult, if not impossible. Instead, liability should be established on the principle of risk, holding parties accountable for damages caused by AI, even when their actions comply with international law.

Thus, the central problem of this study is to answer the following question: What international liability applies to damages caused by AI technologies under the framework of international law? Furthermore, on what basis can liability be established in situations where proving fault is challenging?

The study aims to create an international legal framework to regulate damages caused by AI applications under public international law. It seeks to define liability in cases where harm is inflicted on individuals or entities recognized under international law.

The significance of this research lies in its focus on a novel international legal challenge—addressing the unpredictable and widespread harm caused by emerging AI technologies. These risks are often difficult to anticipate or quantify, making fault-based liability inadequate. Instead, a new model of risk-based liability is necessary to align with rapid technological advancements. Such a framework is essential to ensure the protection of individuals and entities from harm caused by these emerging technologies.

This research adopts a combination of descriptive, analytical, and inferential methods. It describes relevant concepts, analyzes international legal texts, and draws insights from articles, books, and other resources related to AI.

The research is organized as follows:

- **Topic 1: Legal Regulation of Damages Arising from AI Technologies**

Requirement 1: Traditional International Liability vs. Risk-Based Liability

Requirement 2: Cases Applying Risk-Based International Liability

- **Topic 2: The Role of AI in Establishing Risk-Based Liability**

Requirement 1: International Liability for AI in Weapons Applications

Requirement 2: Risk Theory in AI-Related Damage Liability

Topic 1: Legal Regulation of Damages Arising from AI Technologies

Whenever AI is utilized, there is an inherent risk of damage, regardless of whether the use is lawful or unlawful. This leads to two forms of liability: traditional fault-based liability and risk-based liability. Risk-based liability is particularly relevant in activities involving significant hazards, aligning well with contemporary technological advancements. The following sections examine traditional liability and risk-based liability (Requirement 1) and explore cases where liability based on risk is applied (Requirement 2).

Requirement 1: Traditional International Liability vs. Risk-Based Liability

In analyzing international liability, it is essential to differentiate between traditional liability, which relies on proving fault, and risk-based liability, which holds parties accountable for harm regardless of fault.

Traditional International Liability and Risk-Based Liability

1. Traditional International Liability

The term "liability," in its general linguistic sense, refers to the state or capacity of an individual being accountable for an obligation. In legal terms, liability involves the responsibility to rectify harm caused to others in accordance with the law.

International responsibility, as defined by Dr. Salah Hashem, is "a set of legal rules that place obligations on the subjects of international law to prevent and reduce harm that may be caused to another international person, as well as the obligation to repair the harm caused to others." This definition highlights two key aspects of liability: a preventive role aimed at averting harm and a corrective role focused on repairing harm (Hashem, 1991, p. 76). Similarly, Dr. Salah Al-Din Amer

defines traditional international responsibility as "the set of legal rules governing any act or incident attributed to one of the subjects of international law, resulting in harm to another subject of international law, and the consequent obligation of the former to compensate" (Amer, 2002, p. 726). Foral international liability to be established, two essential elements must be present:

1. **Substantive Element**: This involves an action or omission that contravenes an international obligation, constituting an internationally wrongful act (fault element). This act must result in injury to another state, fulfilling the damage element (Youssef, 2018, p. 417) .
2. **Persona*: This element establishes that a state or another international legal person committed the violation of an international obligation attributable to a subject of international law (causation or attribution element) (Al-Damouk, 2003, p. 170) .

2. INTERNATIONTY ON THE BASIS OF RISK

The rapid advancement and diverse applications of artificial intelligence (AI) bring numerous economic, technological, and military benefits to nations. However, these technologies also pose risks of harm to other states. These potential harms transcend the framework of traditional fault-based liability and fall under the concept of **risk-based liability** (also known as objective liability).

Risk-based liability is built on two fundamental pillars: **damage** and **causation**, without requiring proof of fault or negligence. According to Dr. Mohammed Talaat Al-Ghunaimi, liability on the basis of risk is "a legal status under which the state accused of carrying out an act or activity is obligated to compensate for the damage caused to another state or one of its nationals as a result of such act or activity" (Al-Ghunaimi, 1982, p. 245) .

Dr. Ahmed Abu Al-Wafa further that this form of liability arises from damages resulting from legitimate activities that carry inherent risks. He defines it as "the responsibility that the state incurs because of the damages resulting from legitimate activities involving great risks, regardless of negligence or error on the part of the state." Under this theory, states are held liable for hazardous activities without fault, as a reflection of the principle of "fine for sheep," meaning that states benefiting from an activity must bear its risks and consequences, even if the activity is lawful (Abu Al-Wafa, 2004, p. 322) .

From this perspective, liability on therisk requires no evidence of fault. Instead, it hinges on the occurrence of harm caused by an activity. While states have the sovereign right to use AI technologies to pursue their interests domestically and internationally in alignment with the objectives of the United Nations, this right is not absolute. States are restricted by the obligation to act in good faith and avoid causing harm to other states. Violations of these principles can subject states to sanctions or penalties (Attia, 2007, p. 270) .

In summary, risk-based liability represents a shrnational legal principles, recognizing the unique challenges posed by advanced technologies like AI. It underscores the responsibility of states to balance their pursuit of progress with the obligation to mitigate harm and uphold international norms.

The Second Requirement: Application Cases of International Liability Based on Created Risks

With the rapid advancements in technology and the rise of modern industries, including artificial intelligence applications, the international community faces new challenges. These developments have caused harm across borders, disrupting international public order. To address this, it has become essential to apply strict rules of public international law and hold responsible parties accountable. This responsibility is necessary even when their actions are lawful. The principle of international liability based on risk has thus become a critical tool in regulating these issues. Liability can be applied in the following cases:

1. Difficulty Proving Fault Despite Evident Harm

International liability often requires proof of fault that causes harm. The burden of proof lies on the injured party. However, with the complexities of modern technologies, proving fault has become increasingly difficult. Victims may lack the technical knowledge to demonstrate the source of harm. This gap in evidence can prevent them from receiving compensation, even when the

damage is clear. Abdel Aziz (2012, p. 29) notes that relying on traditional liability frameworks no longer aligns with modern realities. Instead, a new legal framework based on risk must be established to ensure fair compensation for those affected.

2. Risks Associated with Modern Technologies

Modern technologies, while fostering growth and prosperity, also introduce significant risks to societal safety. These risks stem from industrial and technological activities that, while legitimate and beneficial, can cause harm without violating any international obligations. Abdel Salam (1999, p. 98) highlights that such activities often serve public interests and contribute to global success.

A key example is the integration of artificial intelligence in industries. While this innovation boosts productivity, it also presents unique dangers. Al-Barawi (2009, p. 103) emphasizes that the general rules of international responsibility are insufficient to address these new risks. The traditional fault-based approach is inadequate, as injured parties often cannot prove fault in these complex scenarios. Therefore, many legal scholars advocate for adopting liability based on risk, particularly for harms arising from these novel and evolving activities.

3. Activities That Are Inherently Dangerous

Certain activities are inherently hazardous due to their nature. Examples include the production, use, and transport of dangerous materials. These activities require a specialized liability system that does not rely on proving fault but instead focuses on the risks they pose. Such activities include nuclear energy, hazardous waste management, and biological processes. Ibrahim (2007, p. 70) underscores that the dangers of these activities can affect entire cities and extend to future generations.

In this context, it is crucial to apply the risk-based theory to establish international responsibility for high-risk but lawful activities. Examples include the peaceful use of atomic energy, oil exploration, and the transportation of hazardous materials by sea (Hashem, 1991, p. 136). Additionally, the use of artificial intelligence in military operations poses significant dangers. Modern technological means complicate the injured party's ability to prove fault, harm, or the causal relationship between them. Given these extreme risks, liability must focus on the inherent dangers these activities pose to individuals and societies worldwide.

The Role of Artificial Intelligence in Establishing Responsibility Based on Risk

The application of international responsibility is crucial in external legal systems, collective relations, and public law. No legal system can function effectively without strict rules that regulate responsibility in cases of violations. This section examines international responsibility through the lens of risk theory, focusing on artificial intelligence (AI). Before addressing the application of this theory (discussed in the second requirement), we explore the issue of responsibility in military operations utilizing AI technologies.

The First Requirement: International Responsibility for the Use of Artificial Intelligence in Weaponry

The integration of AI into weapons systems means that these machines operate autonomously, making decisions independently of human intervention. This raises significant questions about responsibility when such systems violate international humanitarian law. Who is accountable for the damage and losses caused—both human and material? This discussion addresses two key aspects of liability: **international criminal responsibility** and **international civil responsibility** for violations caused by smart weapons.

1. International Criminal Responsibility for Violations by Smart Weapons

Despite advancements in AI, humans remain central to its development and deployment. International humanitarian law focuses on holding individuals accountable—those who create, produce, program, or decide to use AI in military operations. As Sassoli (n.d., p. 149) explains, commanders and operators must ensure sufficient human oversight of weapons systems to comply with the law. Fully autonomous weapons that operate without human control contradict legal principles.

Two primary perspectives have emerged regarding the criminal responsibility for violations caused by smart weapons:

Trend 1: Programmer or Manufacturer Responsibility

Smart weapons themselves cannot be held accountable as they lack legal personality or intent. Instead, responsibility falls on the humans behind their creation and use. However, attributing liability to manufacturers or programmers faces two major challenges:

1. **Disclosure of Risks:** Manufacturers and programmers often inform buyers of the potential for these weapons to mistakenly target the wrong objectives. By doing so, they shift responsibility to the parties deploying these weapons in combat. Hatem, Abdel Baqi, and Al-Azzawi (2019, p. 32).
2. **Autonomy Claims:** Manufacturers and programmers may argue that these weapons operate autonomously, distancing themselves from liability.

Article 25(3)(a) of the Rome Statute provides a basis for determining the liability of programmers or designers. However, proving criminal intent—whether the system was deliberately designed to violate the law—is a significant challenge. Ishaq and Salma (2020, pp. 377–378). Additionally, the involvement of multiple individuals in programming complicates the issue further. It is rarely possible to establish that a programmer intentionally designed a system to breach legal principles. Radwan (2022, p. 2835).

As a result, decisions made by AI-powered weapons during armed conflicts are directly linked to their integrated programs. Violations of international humanitarian law cannot merely be attributed to technical malfunctions. However, directing international responsibility toward the designers and programmers of these weapons remains challenging due to the complexities of proving intent and the autonomous nature of these systems.

Trend 2: User Responsibility

Attributing criminal responsibility to machines is inherently illogical. This underscores the need to identify human oversight when applying the rules of criminal responsibility. On August 16, 2019, the Group of Governmental Experts acknowledged that robots cannot be held accountable for their actions. Furthermore, assigning responsibility to individuals not directly involved in violations during combat is also problematic. It is difficult to hold military commanders or fighters accountable for crimes resulting from autonomous decisions made by machines—decisions that may not align with programmed instructions or human intentions. As Ishaq and Salma (2020, p. 388) noted, machines cannot logically comply with international criminal responsibility rules.

Some legal scholars argue that users of autonomous weapons should bear legal responsibility for misuse. The user must understand how the system operates and bears responsibility for errors or violations because the machine itself cannot distinguish between right and wrong. This perspective holds that military commanders, as the ones issuing orders and deploying autonomous weapons, must take responsibility. Commanders must also be accountable for any misuse of these systems, particularly if their actions result in violations that could constitute war crimes. Such accountability prevents perpetrators from evading punishment and ensures justice for victims. Christian (2018, p. 3) emphasizes the role of the control standard, which determines whether a commander can effectively oversee a system's conduct—a matter often left to competent courts for investigation. Al-Ayeb (2021, p. 77).

Levels of Human Control

International responsibility is further complicated by the various levels of human involvement in AI-powered weapons systems. Ishaq and Salma (2020, p. 367) identify three levels of control:

1. **Direct Human Control:** The operator directly oversees and manages the weapon system.
2. **Supervisory Human Control:** The operator supervises the system, stepping in as needed to override decisions.
3. **Implicit Human Control:** The system operates independently, with minimal or no human intervention.

These varying levels make it difficult to pinpoint accountability, particularly when determining whether a human's intent is embedded in the actions of the AI system. This challenge further complicates establishing international responsibility for violations committed by these systems.

Ultimately, without clear legal rules or international agreements, assigning responsibility to manufacturers, programmers, or users remains unresolved. This legal ambiguity creates a significant gap in accountability for violations involving autonomous weapons.

2. International Civil Liability for Smart Weapons Violations

Artificial intelligence significantly enhances the military capabilities of states, both operationally and tactically. However, this advancement necessitates careful examination of international responsibility rules when these technologies violate established norms. A key question arises: Should liability rest with the state of the manufacturer or the state deploying these technologies in military operations?

First: Responsibility of the Employing State

When artificial intelligence technologies cause harm to other countries, a specific type of international liability must be considered: liability based on risk (objective liability). This form of liability depends on two main elements—damage and causation—regardless of fault. It is defined as: "A legal situation under which the State accused of carrying out an act or activity is obligated to compensate for the damage caused to another State or one of its nationals as a result of this act or activity" (Al-Ghunaimi, 1892, p. 245).

Article 31 of the 2001 International Law Commission's Draft on State Responsibility affirms: "The State of responsibility is obliged to make reparation for the injury caused by the internationally wrongful act." This obligation is further supported by Article 91 of Additional Protocol I and Article 75 of the Rome Statute. Based on these principles, any state that deploys weapons in violation of treaties or customary rules during armed conflicts is accountable for the resulting breaches.

States employing such weapons in combat must issue clear and strict instructions to military commanders regarding the circumstances and consequences of their use, even without considering complex programming. However, this accountability is civil, not criminal, as current laws do not prescribe criminal penalties for these novel situations.

Second: Responsibility of the State of Nationality

The development and production of any weapon must adhere to international humanitarian law (IHL). A weapon system complies with IHL if it is programmed to respect and not violate its principles. This responsibility rests on the state where the weapon originates. As Sassoli (2017, p. 143) notes, weapons must be designed and produced in line with IHL requirements.

Some legal scholars argue that the state of nationality bears legal responsibility, potentially exempting the user or manufacturer from liability, except when these weapons are used by non-state actors. When independent development of such weapons leads to violations of rights, developers must ensure a certain level of human control to align with IHL rules (Al-Tai & Al-Fatlawi, 2021, p. 86).

A major concern is the potential for these weapons to cause human and material losses that violate IHL. The lack of dependable human oversight makes it challenging to establish criminal accountability or to secure compensation for harm caused. As Hatem et al. (2019, p. 34) point out, this creates significant barriers to holding any party responsible. Therefore, states that develop or acquire these weapons must ensure their use aligns with IHL to prevent violations.

The Second Requirement: Establishing International Liability Based on the Theory of Risk from Damages Caused by Artificial Intelligence

The rapid scientific, technological, and economic developments in the world today have strengthened the concept of international responsibility for states and other international entities. This responsibility has evolved to include legitimate international acts that may cause harm to another state or entity, as highlighted in the *theory of risk*. Originating in national civil law, this theory establishes liability simply for causing harm, even if the action is lawful. Similarly, in public

international law, this theory aims to hold states accountable for risks and damages their activities may impose on neighboring countries, regardless of the legitimacy of those activities under international law (Ayyadat, 2021, p. 55) (29).

Activities involving significant risks often cannot be exhaustively categorized. For example, during discussions in the Sixth Committee of the United Nations General Assembly, the representative of Trinidad and Tobago emphasized that the International Law Commission's draft was narrow in focus. It primarily addressed environmental harm and the trade of chemical waste—materials banned within Western countries but often exported to other nations. The draft sought to establish international liability for such acts due to the harm they cause to states and individuals (Al-Azzawi, 2019, p. 25).

Artificial intelligence (AI) introduces a range of legal challenges. These include issues like legal personality, intellectual property, labor protections, big data governance, cybersecurity, liability, and accountability. AI has also led to the criminalization of many actions, particularly when it is misused to harm individuals or organizations. Such misuse has fueled the emergence of new forms of cybercrime, often referred to as information crimes. These crimes include data manipulation, destruction of information systems, and attacks targeting individuals, property, or governments (Dahshan, 2020, p. 11).

The continual advancement of AI has also facilitated the development of autonomous weapon systems, representing a third generation of military technology. Often referred to as "lethal autonomous weapons" or "unmanned military systems," these tools can operate on land, sea, air, and even in space. Once activated, they can independently select and attack targets without human intervention. Some call these weapons "lethal robot weapons" (Garcia, 2018, pp. 334–341).

Such systems have brought profound changes to warfare, including altering combat tactics and redefining the role of combatants. The most significant fear is that wars could be fought entirely by machines, with robots leading the battles on both sides without human involvement. While this may reduce human casualties among soldiers, it does not lessen the catastrophic consequences for the international community. Given these concerns, traditional fault-based liability systems are inadequate for addressing harm caused by AI applications. These systems require proof of fault or wrongful acts, which is often impossible with autonomous technologies that operate independently of human control (Hammond, 2015, p. 663).

The *theory of risk* in public international law provides a better foundation for addressing such issues. It covers activities with inherent dangers, such as nuclear energy use, space exploration, and AI systems, including autonomous weapons. While these activities are crucial for political, economic, and military purposes, they cannot simply be criminalized. Instead, international rules should be established to protect victims and ensure compensation for any harm caused. This theory is especially relevant to activities of an exceptional nature, as proving fault in these cases is often highly challenging, if not impossible.

The application of international liability under the *theory of risk* has been limited to high-risk activities acknowledged by the international community. Examples include the exploitation of outer space, the use of nuclear energy, pollution of the marine environment, and AI technologies. These activities pose potential harm to states without the possibility of attributing fault or proving a wrongful international act (Al-Shazly, 2022, p. 70).

Given the current global technological landscape, the use of AI systems should be treated as inherently risky, irrespective of their association with specific activities like pollution, nuclear operations, or space exploration. States should bear responsibility for harm caused by AI in any of their activities, without limiting liability to predefined domains. The adoption of the *theory of risk* ensures that victims of AI-related harm are protected, regardless of the context in which the technology is employed (Hadeeb, 2024, p. 130).

CONCLUSION

Artificial intelligence (AI) is no longer a speculative concept; it is a tangible and ever-expanding reality that influences nearly every facet of human behavior and activity. Its integration into all aspects of life reflects a collective aim to harness science and technology for the betterment of society. However, alongside the benefits and aspirations AI brings, it also presents significant risks and concerns. These include potential threats to international relations, the imbalance of power among states, and the harm AI systems can inflict across borders.

Over the past decade, the international community has undertaken persistent efforts to regulate AI technologies. These efforts, led by states and international organizations, have focused on creating ethical guidelines and establishing frameworks to address liability for the harms caused by AI applications. Particular attention has been given to cross-border damages and the need to maintain balance in international relations. Ensuring compliance with public international law has become crucial in holding responsible the states or entities causing harm through AI activities.

The theory of risk has emerged as a necessary foundation for assigning international liability in this context. Unlike the theory of fault, which relies on proving wrongdoing, the theory of risk requires only the occurrence of harm to establish liability. This approach aligns with the realities of modern technological advancements, where proving fault is often unfeasible. By applying this principle, victims of AI-related harm can seek compensation, even when the activities causing the damage are lawful under public international law.

Key Findings

Limited Scope of Risk-Based International Liability:
International responsibility based on risk has traditionally been applied to high-risk economic activities, such as nuclear energy exploitation, outer space exploration, and marine environment pollution. The use of AI technologies should now be included in this category, given the global impact of the technical and technological advancements they represent.

Liability Without Fault:
Risk-based liability allows for the establishment of responsibility once harm is caused, without requiring the injured party to prove fault. This approach is especially relevant for lawful activities under public international law that nevertheless carry inherent risks.

Hazardous Nature of AI:
AI technologies represent exceptional and hazardous activities requiring the application of no-fault liability principles. This ensures accountability for damages caused by such technologies, regardless of intent or control.

Lack of Regulatory Framework for AI-Enhanced Weapons:
AI-driven military weapons lack comprehensive international regulation. These weapons are inherently untrustworthy due to their inability to fully comply with international humanitarian law. Their autonomous nature and lack of human control heighten the risk of significant human and material losses.

Threats to International Peace and Security:
The proliferation of AI-based weapons poses serious risks to global stability. A loss of control or malfunction in these systems could lead to catastrophic consequences, threatening international peace and security.

RECOMMENDATIONS

1. **Risk-Based Liability**:

Liability for damages resulting from AI technologies should be based on the theory of risk. This principle ensures accountability for harm as soon as it occurs, addressing the inadequacy of fault-based liability for unpredictable and high-risk activities.

2. **New International Rules**:

International legal frameworks must evolve to address emerging risks associated with AI. This includes establishing new rules for international responsibility that align with the unique challenges posed by AI technologies.

3. **Expanding the Scope of Risk-Based Liability**:
AI activities and applications should be explicitly included under the scope of the theory of risk, alongside other high-risk fields such as nuclear energy and space exploration.

4. **Regulation of AI Weapons**:

5. A comprehensive international treaty should be developed to regulate AI-enhanced military weapons. This treaty must define prohibited weapons, impose mandatory restrictions, and require systematic reviews of advanced weapon systems.

6. **Incorporation into the Rome Statute**:
Crimes committed by AI systems should be addressed within the Rome Statute. This inclusion would provide a basis for ensuring justice, reparation, and accountability for victims of AI-related crimes.

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