

# The Problem of Establishing Civil Liability for Harmful Effects of Smart Robots

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**Abstract** - The study addresses the definition of smart robots and their legal nature, and attempts to determine their legal classification as objects or products. The study seeks to analyze the possibility of applying the rules of civil liability for objects or civil liability for defective products to smart robots. The study also examines the legal basis for the liability of the guardian of objects for damage caused by smart robots, and the legal basis for liability for defective products for damage caused by smart robots. It also examines the compatibility and conflict between liability for guardianship of objects and smart robots, and the compatibility and conflict between liability for defective products, and the adequacy of current legal systems to address the damages that may result from the use of this advanced technology. The need to develop a modern legal framework that keeps pace with the rapid developments in the field of smart robots has emerged. The study emphasizes the importance of establishing clear legislation to ensure the protection of individual rights and accurately define responsibilities, especially in light of the increasing reliance on modern technology, which opens new doors to legal and ethical challenges.

**Keywords:** Intelligent Robots, Damages, Civil Liability, Modern Technology, Robot Accidents

## I. INTRODUCTION

### 1.1 Study Topic

Smart robots are no longer confined to science fiction; they have become a global industry, attracting millions of dollars in investment, especially in developed countries. These robots are distinguished by their ability to mimic human thinking and sometimes surpass it. They are programmed with massive databases, enabling them to make intelligent decisions (Rayyan et al., 2024; Boopathy et al., 2025; Hossain et al., 2019). Despite their promising prospects in various fields, there are numerous challenges and legal,

ethical, social, and economic issues that are generating global debate, requiring the preparation of regulatory studies and the enactment of specific laws (Alhasan et al., 2024). Intelligent robots are defined as mechanical machines that can perform programmed tasks, either by humans or by a signal from digital programs (Fakhouri et al., 2024; Matkarimov et al., 2025; Sánchez-Ancajima et al., 2023; Abdulqader, 2022; Dziedzic, 2023). The tasks that robots are programmed to perform are usually difficult, dangerous, or highly sensitive. They are also defined as human-made objects capable of physical interaction with the outside world, without the need for direct human control. They are also defined as devices pre-programmed to perform specific tasks with superior efficiency and speed than humans, such that they have the ability to improve performance and execute tasks effectively (Shehata, 2024; Verma, 2018). These machines are divided into two types: the first operates independently of its operator, as it can make decisions and execute commands on its own, while the second depends directly on the supervision or guidance of its operator to perform its tasks. (Abu & Issa, 2022). As for the legal definition of smart robots, referring to the laws in force in Jordan, we note that Jordanian law has not provided a clear and explicit definition of artificial intelligence (Arietti & Smítal, 2025; Čerka et al., 2015; ElKhatib & Arfan, 2020; Khaleel et al., 2023; Kharitonova et al., 2022; Muharab, 2023; Muharab, 2023). Researchers believe that smart robots can be defined as machines programmed and designed to perform multiple tasks autonomously, with the ability to learn, adapt to different conditions, and make appropriate decisions, thanks to their sensors (Al-Kasassbeh et al., 2024; Albnian & Algaber, 2025; Al-Kholy, 2021).

### 1.2 Importance of the Study

The importance of this topic is highlighted because it is one of the modern and important fields that will play a major role in the future, as it is the language of the future. This requires clarifying the provisions related to damages resulting from the spread of smart robots, especially with the increasing use of them in light of the advancement of technology, as smart robots are considered a branch of science and overlap with complex legal issues (Turan & Ergenler, 2023; Dennis & Ramos, 2016). The difficulty increases because they represent one of the most dangerous technologies, as the study aims to clarify the concept of smart robots and to demonstrate the extent of application of the rules of civil liability and civil liability for defective products from the damages of smart robots according to civil liability in Jordanian legislation and drawing on French legislation (Asran & Hamdan, 2023).

### 1.3 Research Problem

The increasing prevalence of smart robots that make decisions independently of their designer or user has led to the emergence of risks and the occurrence of material and moral damages to others. Therefore, the problem has arisen regarding the extent to which the concept of robots is linked to the concept of a thing or product within the scope of civil liability, and the extent to which liability for damages resulting from them, particularly liability for defective products, is applicable. These questions can be summarized as follows:

- What is the legal nature of smart robots?
- Can smart robots be classified as things or products?
- Can the rules of liability for things or the rules of liability for defective products be applied?
- How adequate are the general rules of civil liability to govern damages arising from the use of smart robots?

### 1.4 Study Methodology

Researchers will follow a descriptive and analytical approach in studying this topic, by providing an accurate description of the legal rules applied in the Hashemite Kingdom of Jordan in the field of modern technologies, with an analysis of their efficiency and suitability to the challenges imposed by smart robots, and an analysis of the legal texts related to the topic. Researchers will also rely on the deductive approach to extract legal provisions and principles that may be applied in cases not directly included in the legal texts. The legal principles related to smart robots will be deduced based on the general rules in both Jordanian legislations, with reference to some texts of French laws

## II. APPLICATION OF THE RULES OF OBJECT LIABILITY FOR DAMAGE CAUSED BY A SMART ROBOT

The extent to which the rules of liability for the custody of objects can be applied depends on the fulfillment of the

conditions of civil liability related to the custody of the object. Proving damage is based on the existence of an act on the object under custody (Yas et al., 2023). To address the extent to which the rules of custody of objects can be applied to smart robots, researchers will explain the concept of the object, presenting the justifications of those who adopt the view that smart robots are considered objects that require special custody, as their custodians meet the conditions of a traditional custodian (Al Atiyat et al., 2024). The opposing viewpoint will also be presented as follows:

### 2.1 The Possibility of Applying the Concept of a Thing to a Smart Robot

Things are defined in Article (54) of the Jordanian Civil Law No. (43) of 1976 as: "Everything that can be possessed, materially or morally, and that is lawfully usable, and that does not fall outside the scope of dealings by its nature or by virtue of the law, may be the subject of financial rights." A thing is also defined as every material, inanimate, and intangible thing that requires special protection. Except for intangible things, animals, and buildings, due to the special rules set forth by the legislator for this purpose. Things are divided into several categories, the most important of which are stability and permanence. They are divided into real estate, movable property, real estate by designation, and movable property by virtue of their value. In order to deal with these things, they must be suitable for dealing, whether by their nature or by virtue of the law, as Article (54) of the Jordanian Civil Law clarifies. As for things that are outside the scope of dealings by their nature, no one can own them. Likewise, things that are outside the scope of dealings by virtue of the law cannot be the subject of financial rights. This is also what Article (54) of the Jordanian Civil Law stipulates. (517) of the French Civil Code.

Article (291) of the Jordanian Civil Code also states that: "Anyone who has at his disposal objects that require special care to prevent damage, or mechanical machines, shall be liable for any damage caused by these objects, except for damages that cannot be avoided, without prejudice to the special provisions contained therein (Musleh & Al-maamari, 2025)." Liability for objects in general, whether dangerous or otherwise, as stipulated in the previous article and Article (1242) of the French Civil Code, places a person responsible not only for the damage caused by his actions, but also for the objects in his custody. However, this type of tortious liability requires that the injured party prove the person's actual custody of the robots at the time the damage occurred. Researchers believe that Jordanian and French legislators have tended to consider objects to be any inanimate, tangible object. If we were to apply the concept of objects to intelligent robots, we would find that they can be classified as objects, given that robots are inanimate, tangible objects (Kumar & Rao, 2024). Smart robots are also considered objects, such that they have their own guard. One of the individuals responsible for manufacturing the smart robots determines this guard, to guard them (Othman, 2021).

Another view is that they cannot be classified as objects from several aspects. One is the personal aspect, as it is difficult to determine a guard for these smart robots due to the intervention of several individuals in manufacturing and designing these systems. The objective aspect is that they are considered among the intangible, i.e., moral, objects, according to Article 56/2, which states that objects are not subject to control by their nature, as they are among the intangible elements, as they are based on a highly accurate algorithm. The practical aspect is that it is difficult to control these smart robots, which make decisions on their own after their manufacture is completed. Researchers believe that if the concept of inertia does not apply to smart robots, since the concept of inertia implies the inability to move, then smart robots base their work on the nature of movement, which removes them from the framework of inertia. As for the object, if we want to describe the object in smart robots, it is subject to differences. On the one hand, this is not possible because smart robots are based on analysis and thinking independently of humans (Al-khawaja et al., 2025). On the other hand, it is possible to describe the object in smart robots because the object is everything that falls within the material, not the moral, realm, and this object is inanimate. However, it has been criticized that smart robots are objects because they are not like deaf, mechanical, or special-care machines. The owner does not have the authority to direct, monitor, or guard them, according to the guardian theory of objects. They are not driven and driven things, but rather have a degree of independence. The guardian does not have complete control. The programmer, owner, and user each play a role in the operation of smart robots. Some of these smart robots may get out of control. Smart robots have the ability to come up with solutions that humans might not think of, and they may deviate from the solution that is usually produced by human cognitive processes. Therefore, the solution of smart robots is not expected, even for the programmer of smart robots (Boabbas & Mohamed, 2025). It may be difficult for humans to control machines programmed to operate with great independence. Therefore, researchers should have looked for another idea whose provisions are completely consistent with the provisions of smart robots.

## *2.2 Legal Basis for the Liability of the Custodian of Objects for Damage Caused by a Smart Robot*

Custody is defined as: "actual control in directing, monitoring, and disposing of a thing". It is also defined as: "actual authority over a thing in terms of monitoring, directing, and utilizing it". Liability for the custody of objects is established in Jordanian legislation in Article (291) of the Civil Code, which states: "Anyone who has at his disposal objects that require special care to prevent damage, or mechanical machines, shall be liable for any damage caused by these objects, except for what cannot be prevented, without prejudice to the special provisions contained therein." Liability for the custody of objects is also established in French legislation in Article (1242), which considers smart robots to be a mechanical structure or body. The conditions for establishing liability for things, according

to the previous text, have been derived by Islamic jurisprudence. These conditions are summarized in the availability of the property's characteristics, meaning that everything that can be the subject of financial rights. The law only requires that a thing be outside of the scope of transactions by its nature or by law (Adams, 2009). The article also mentions two examples of things that could trigger the liability of its custodian: mechanical machines and things whose custody requires special care due to their nature, such as flammable materials and medical drugs. It also stipulates that the thing must cause harm, such that it is the originating cause of the harm or the instrument of the harm. It also stipulates that the thing must be subject to intentional and independent custody under actual, rather than legal, control by the custodian. The custodian is the one who has the authority to direct, monitor, and dispose of the thing, as the decision-maker regarding the use, direction, and disposal of the thing. When control is achieved, custody is achieved. If the guardianship exists in the previous sense, the guardian becomes responsible for compensating for the damages caused by the thing during its guardianship, given that the error is conceivable on his part once the damage occurs to others, and he cannot avoid liability except by proving the external cause or force majeure or by adhering to the error of the injured party or the error of others.

## *2.3 Compatibility and Conflict of Responsibility for Guardianship of Objects with Intelligent Robots*

Some commentators support the consideration of applying the rules of object liability to smart robots as appropriate to say that the rules of custody of things can be applied to smart robots due to the availability of the conditions for the establishment of object liability. In order to defend his position, he presented several arguments, namely that the material applications of smart robots are undoubtedly considered things, as they are material movables, and thus the provisions of liability for custody of things can be applied to them, given that they have a tangible material existence (Al-Jamil & Al-Jamil, 2021). Accordingly, the special nature of those applications requires them to be included under the umbrella of things whose custody requires special care (Al-Bsharawy & Al-Mashhad, 2021), in implementation of Article (291) of the Jordanian Civil Code and Article (1242) of the French Civil Code. As for the non-material applications of smart robots, the supporters of this trend confirm that the intangible applications or moral components of smart robots, such as programs, systems and algorithms, also fall under the umbrella of things as they are among the moral things, and as they are ultimately computer programs, and thus they are the subject of rights.

Furthermore, smart robots of a physical or moral nature can cause harm to others. For example, smart robots can adjust the temperature of a room excessively and unbearably, which could then cause the death of those present in the room. Supporters of this group cite the numerous and frequent accidents caused by self-driving cars or autonomous smart robots (Al-Jamil & Al-Jamil, 2021). Furthermore, it is

conceivable that smart robots could be guarded despite their autonomy. This autonomy is not absolute, as ultimately, the human element remains the controller of the smart robots' operation and deactivation, and thus remains the actual guardian of the smart robots. Therefore, proponents of this approach believe that it is conceivable that a doctor, as a guardian of objects, could be held liable for damages sustained by a patient because of a procedure performed by smart robots. Some jurists oppose the application of the rules of object liability to smart robots, considering them inappropriate. Proponents of this approach believe that the majority of smart robots lack a tangible, material character.

They are software and algorithms that mimic human intelligence and are linked to the virtual, not the real, world. They represent human intellectual creativity that falls under the umbrella of the literary aspect of intellectual property rights. They cannot be considered objects in the traditional sense. This description has prompted some to describe smart robots as a unique "object" that transcends the concept of a familiar object and becomes an unfamiliar object (Al-Khatib, 2020). Smart robots also enjoy autonomy, which contradicts the idea of their being subject to guardianship and the ability to make decisions unexpected to the guardian (Awaisheh et al., 2024). This is because most smart robots enjoy a high degree of independence and freedom in decision-making.

Accordingly, the guardian of smart robots does not have actual guardianship over these systems and technologies, because the idea of the independence of smart robots makes them far removed from the control of the manufacturer and programmer...and the developer, the user, and the owner; therefore, any of them has the right to deny liability for themselves, based on the fact that they are not the one managing and controlling the actions of smart robots (Muhammad, 2021). We find that the guardianship that entails liability, according to Article (291) of the Jordanian Civil Code and Article (1242) of the French Civil Code, is achieved by the natural or legal person's actual control over the thing in terms of use, direction, and oversight on their own behalf (Drake & Watson, 2024). The characteristics of independence and unpredictability allow the guardian to be exempt from the rules of guardianship, considering them a force majeure or an external cause. This has prompted a section of jurisprudence to advocate for the necessity of liberating the guardian of smart robots from liability for the objects, given that the independence of smart robots and the ability to make unexpected decisions can be adapted as a force majeure, negating the guardian's liability for the actions and behaviors of smart robots (Almahi & Ahmad, 2023). Since some actions of autonomous smart robots occur unexpectedly and in an unavoidable manner, thus negating the causal relationship between the error committed by the smart robot and the harm caused to others, from the moment the smart robot begins operating, it becomes independent of all those involved in its manufacture and those who benefit from its use, which requires that it alone bear responsibility (Bo, 2022). Regarding independence and unpredictability as

an external cause that exempts from liability, the smart robot's custodian may avoid liability if he proves that the damage is due to a defect in the design or an update to the smart robot's application, rather than to the custodian. This is supported by what was settled by the Jordanian Court of Cassation No. (1721) of 2023 AD, stating that the liability for a thing is based on a conclusive legal presumption that does not accept proof to the contrary, which is the assumption of the error of the keeper of the thing. Therefore, the keeper of the thing is responsible when an error occurs from the thing under his custody, and he cannot avoid liability except by establishing evidence that the error that resulted from the thing arose from an external cause in which he had no hand, and on the condition that it is unforeseeable and unavoidable. The issue of assessing the extent of the possibility of foreseeability or the possibility of prevention is subject to the objective standard without regard to the personality or circumstances of the keeper. It is also difficult to determine the guardian actually responsible for the error, especially in the non-material aspects of smart robots. This is due to the overlap of actors and contributors to the physical and moral control of smart robots. If it is impossible to identify the guardian, it is consequently impossible to prove the error, which results in the absence of liability (Alqudah, 2023). Since the guardian is the one who has actual authority over the object, this description does not apply to the guardian of smart robots. This makes the concept of traditional guardianship insufficient to encompass the guardianship of autonomous smart robots (Dahiyat, 2019; Hekmatnia et al., 2019).

The researchers believe that by examining the idea of applying guardianship of an object to smart robot technologies, it becomes clear how difficult it is to apply object liability. It is worth exploring another idea whose provisions are fully consistent with the provisions of liability for smart robots.

### III. APPLICATION OF THE RULES OF LIABILITY FOR DEFECTIVE PRODUCTS TO DAMAGES RESULTING FROM THE USE OF SMART ROBOTS

The failure to apply civil liability to those harmed by smart robots as previously stated has prompted some scholars to explore another basis, namely the possibility of applying liability rules for defective products. In this regard, researchers will review the basis of liability and explain the legal trends supporting and opposing the application of this liability to smart robots, as follows:

#### 3.1 Intelligent Robots and Product Concept

Some jurisprudence considers intelligent robots, relative to humans, to be an intangible intellectual product linked to copyright. This can be considered a product, rather than, as previously stated, a product that applies in principle to both tangible and intangible things (Al-Khatib, 2020).

The Jordanian legislator defines a standard specification through Article (2) of the Specifications and Metrology Law No. (22) of 2000 as "A registration document, instructions, or characteristics of a service, product, production methods, or management systems for general and repeated use. It also includes conditions, symbols, data, trademark instructions, and information card requirements that apply to a product or its production methods, or are established on any of them. Compliance with these specifications is not mandatory." A commodity or product is defined in Jordanian Consumer Protection Law No. (7) of 2017 as: "Any movable property obtained by a consumer from a supplier, even if attached to immovable property, including non-possessed power such as electricity." The French legislator regulates liability for defective products in Articles (1245-1245/17). The French legislator defined it in Article (1245/2) as: "Any movable property, even if it becomes part of real estate, including land products, livestock, marine hunting, and fishing products. Electricity is considered a product." The Jordanian Court of Cassation also defined a commodity, "product," or service as: "A commodity or service, as defined in the Consumer Protection Law, is one that is capable of distribution, trade, manufacture, or rental and, by its nature, bears a trademark or the name of the supplier."

Smart robots can be classified within the concept of products in both their material and intangible dimensions. The physical dimension relates to the external structure of smart robots, which is a physical product. As for its moral dimension, the mental thinking of the smart machine represents it, which is a moral product. Although smart robots are considered dangerous products, they do not necessarily have to be defective in manufacturing. This means that these systems may provide safety, yet their operation may cause injury to others, especially since these systems are independent in the way they operate, which leads to the inability to classify them within the concept of products.

Based on the above definitions according to the Jordanian Standards and Metrology Law and the Jordanian Consumer Protection Law, researchers conclude that smart robots can be classified as products, as the definition addresses the terms commodity and service. The term commodity is a double-edged sword. On the one hand, it can be considered a product if we mean by smart robots the external structure when buying or selling them. On the other hand, it is difficult to consider it as a commodity if we mean non-material things because it is based on an intelligent mechanical system that is closer to the thinking of the human mind.

### *3.2 Basis of Liability for Defective Products Due to Damage Caused by Smart Robots*

Defective products are defined as products that lack the desired safety due to a manufacturing, production, transportation, or storage defect, regardless of the person responsible for the defect, whether the producer, the carrier, or someone else.

First, it should be noted that a dangerous product is not necessarily a defective product. A dangerous product is one that is inherently and inherently dangerous, such as chemicals, or one that is inherently dangerous, such that it possesses a characteristic that makes it a dangerous product. A defective product, on the other hand, is one that is identified based on the harmful effects that arise from the conditions surrounding the product, particularly its presentation and use. The Jordanian legislator has organized the liability for defective products in Articles (4, 6) of the Consumer Protection Law. The French legislator has also organized the liability for defective products in Article (1245) of the French Civil Code, where Article (4) of the Jordanian Consumer Protection Law stipulates the obligations (Blanc-Jouvan, 2008; Patterson, 1942 ) of the supplier, in addition to Article (6/A) which stipulates that the commodity or service is considered defective in any of the following cases: "1- Failure to meet safety requirements for the purposes of normal or expected use. 2- Failure to comply with the applicable mandatory technical regulations. 3- Failure to comply with the declared characteristics or failure to achieve the declared results for the consumer. 4- Failure to achieve the declared levels of performance or quality in the commodity or service or the presence of a defect or deficiency in it or its unsuitability for use according to what it was prepared for for a period appropriate to its nature." The provisions of the Jordanian Standards and Metrology Law, in Articles (10, 11, and 12), also include protection from damage caused by defective products and their monitoring. Accordingly, the producer is liable for any damage suffered or caused if it is proven that the damage arose due to a defect in the product attributable to its design, manufacture, or installation. From the above, we find that the Jordanian legislator requires two conditions for liability for defective products (Deaconu-Dascălu, 2017).

The first is a description of the product or commodity, as Article (2) of the Jordanian Consumer Protection Law states: "Any movable property obtained by the consumer from the supplier, even if it is attached to immovable property, including non-possessed power such as electricity." The second is the presence of a defect in the product, as defined previously.

### *3.3 The Compatibility and Conflict of Liability for Defective Products Due to Damage Caused by Smart Robots*

Smart robots were divided into two groups, each of which justified its arguments with support and opposition. The arguments of the supportive opinion were that the possibility of applying smart robots in light of the legal texts that defined the product, whether the text of Article (2) of the Jordanian Consumer Protection Law or Article (1245/2) of the French Civil Code. Supporters of this trend were enlightened to apply the rules of liability for defective products, from which two conclusions were drawn: First, that the physical applications of smart robots can be viewed as products subject to the provisions of the previous texts, as they are ultimately tangible, material transfers. Second, that

"intangible" smart robots, such as programs and algorithms, are described as products, despite the absence of a tangible material nature. This is because the texts that defined the product, whether the text used the term "goods or services" or the term "transferred," were absolute and without any distinction between the material product and the intangible product. Moreover, errors and damages caused by smart robots are often due to manufacturing defects. Therefore, the provisions governing liability for defective products are most consistent with the nature of smart robots as defective products, regardless of their physical or digital nature, as long as the producing company or programmer retains control over updating and developing the systems Nikolinakos, (2024); Nobile, (2023).

They are therefore liable for all damages incurred by third parties as a result of the actions and behavior of defective smart robots, whether the defect is in their physical or moral construction, or the result of negligence on the part of the producing company, and whether the defect occurred before or after the smart robots were introduced to the market (Al-Bshrawy & Al-Mashhad, 2021; MacLeod, 2011). Their arguments also included that when there are multiple producers in the smart robotics industry, it is possible to distribute liability for defective smart robots among those involved in the manufacture and development of smart robots, each according to their contribution to the error and in accordance with the degree of autonomy enjoyed by the smart robots. Liability should be proportional to the degree of control of the producer, programmer, and developer. Thus, the greater the degree of autonomy of the smart robots, the less the liability of the producer, programmer, and developer will be, and vice versa. However, the aforementioned justifications were not accepted by another branch of jurisprudence, which affirmed its complete rejection of subjecting smart robots to the rules of liability for defective products. The opposing view held that the concept of a product applies to the legal description of a thing, and that smart robots fall outside the concept of a thing due to their predominance.

Its moral nature and its ability to act with a degree of independence make it inconceivable that it be considered a product subject to the provisions of liability for defective products.

These systems are closer to services than to products, which leads one to believe that the definition of a commodity contained in Article (2) of the Jordanian Consumer Protection Law and Article (1245/2) of the French Civil Code does not apply in any way to the concept of smart robots, as most smart robots are of a moral nature, even their physical applications rely fundamentally on programs and algorithms more than they rely on a physical external structure. Moreover, most errors transcend the limits of machines, not humans. The actions, behaviors, and decisions made by smart robots are autonomous. Even if they result in harm to others, not all of them are actually defects. Rather, they represent a

fundamental component of smart robots, enabling them to perform the tasks they were programmed to accomplish or make decisions. Liability for defective products requires the injured party to prove the defect in smart robots. This is impossible in many cases due to the difficulty of proving a causal relationship between the error made by smart robots and the harm caused to others.

This is due to the complexity of smart robot systems and technologies, as well as the difficulty of drawing the line between harm caused to others by smart robots themselves, through their ability to learn independently and make decisions and act independently, and harm resulting from a defect in the manufacturing or programming of smart robots. This trend notes that the inability to identify the person responsible for the defect causing the damage, when multiple people have contributed to the manufacture, programming, and development of smart robots. This may result in the liability for defective products being emptied of its substance. This empties the liability of its substance, making it impossible for the injured party to obtain compensation, given the ease with which the smart robot producer can evade liability. After reviewing the possibility of applying liability for smart robots in accordance with the rules of subject-matter liability and the rules of liability for defective products, the researchers find it difficult to accept these rules as a basis for applying these rules to damages caused by smart robots. Applying these rules would result in the person responsible for smart robots being exempt from the obligation to pay compensation to the injured party, due to the difficulty or impossibility of proving error and damage, or the impossibility of recourse against the person who caused the damage (Saad, 2004; Schachter, 2017). However, the closest theory, now, is the theory of objective liability for defective products. Accordingly, legislation must be developed that outlines solutions capable of holding smart robots of a special nature accountable.

#### **IV. THE RESULTS, CONCLUSION AND RECOMMENDATIONS**

##### **4.1 Results**

- Smart robots differ from similar systems in several aspects, and their uses vary greatly across various fields, such as medicine, transportation, and the military. This poses numerous legal challenges. Among these challenges are issues of civil liability in the event of damage or failure resulting from the use of these robots in all fields. The use of these smart systems requires legal regulation that ensures effective control, in terms of defining responsibilities and avoiding risks, ensuring their safe and effective use.
- There are multiple bases for civil liability for smart robots, through which liability for damages caused by smart robots can be determined. On the one hand, liability can be considered liability for defective

products based on consumer protection laws, specifications, and standards. Smart robots are viewed as products marketed to consumers, which necessitates the application of rules for defective products in the event of damages. On the other hand, smart robots are also considered objects under guardianship, which allows for the application of the rules of liability for intangible objects under civil law, especially in the event of damage or breach resulting from an unlawful act by a smart robot.

- The overlap between legal responsibilities highlights the challenge of clearly defining civil liability due to the overlap between the various parties involved in the development and operation of smart robots, such as developers, programmers, manufacturers, owners, and users. This overlap makes it difficult to accurately determine who is responsible for damages, and necessitates the establishment of a unified legal framework that can effectively address this overlap. Therefore, comprehensive legal standards must be developed to clarify the responsibilities of each party involved in the design and operation of smart robots.
- Inadequacy of Current Legislation: Although Jordanian legislation recognizes smart robots as products subject to liability for defective products or as intangible objects under guardianship, Jordanian law does not include specific provisions that fully regulate the liability of smart robots. Therefore, this issue requires the development of specific legislation that comprehensively addresses the liability of smart robots, taking into account the technical and ethical complexities related to them. Such legislation should provide a flexible legal basis that allows for the precise and effective application of the principles of civil liability, although the closest of these theories, now, is the theory of objective liability for defective products. However, on the other hand, smart robots can be considered among objects under civil law, in accordance with the text of Article (291) of the Jordanian Civil Code and Article (1242) of the French Code, in terms of their programming and mind, i.e., objects, a special guardian is designated for smart robots, and this guardian is among the persons responsible for their design and manufacture, and is represented by civil liability for the harmful act of objects under guardianship that require special care to prevent their harm.

#### 4.2 Conclusions

The rapid development of smart robots presents complex legal challenges, particularly concerning civil liability for damages they cause. The variability in their characteristics ranging from tangible physical machines to intangible algorithms complicates their classification under existing legal frameworks. The debate over whether these entities should be considered objects under guardianship or products

subject to defective product liability remains unresolved, highlighting gaps in current legislation. Jurisprudence suggests that the autonomous nature of smart robots often diminishes traditional notions of guardianship, raising questions about responsibility attribution. Applying existing liability models, such as objective liability for defective products, may be insufficient due to the unique features of intelligent systems, notably their capacity for independent decision-making. Consequently, there is a pressing need to develop specialized laws and regulations that address these technological innovations. International experiences offer valuable insights; for instance, European legal reforms are increasingly recognizing the necessity of establishing clear responsibilities for autonomous systems. Such legislation should also consider establishing insurance schemes to mitigate damages and explore legal personhood for autonomous robots. Overall, comprehensive legal adaptation remains essential to ensure protection, accountability, and ethical governance of smart robotic technologies in our society.

#### 4.3 Recommendations

- Issuing legislation regulating the legal provisions pertaining to smart robots, obligating all users of smart robots to register them with the relevant authorities so that those involved in the field of smart robotics can be identified and held responsible for the damage, proving the error and damage, and recourse can be had to the person who caused the damage to pay fair compensation to the injured party.
- Given the inconsistency of the concept of actual guardianship in civil liability for items requiring special care to prevent damage, we propose amending Article (291) of the Jordanian Civil Code until a law is issued regulating the provisions pertaining to smart robots, to read as follows: Anyone who has at their disposal items requiring special care to prevent damage, mechanical machines, or smart robots, shall be liable for any damage caused by these machines and systems, except for damages that cannot be prevented. This is without prejudice to the special provisions contained therein.
- Benefiting from foreign expertise that has made significant strides in the field of smart robotics, the legal issues they have encountered, and how they have addressed and resolved them.
- Establish an insurance system to cover all damages caused by smart robots, regardless of the person responsible, to provide protection for those affected. Alternatively, establish funds to compensate those affected for damages caused by smart robots in the absence of insurance coverage.
- Examine the feasibility of the legal person theory for smart robots, and explore the need to establish a new

legal entity commensurate with the autonomous and [14]  
unique nature of smart robots.

## Laws

- Jordanian Civil Code No. (43) of 1976 and its amendments.
- Jordanian Consumer Protection Law No. (7) of 2017 and its amendments.
- Jordanian Standards and Metrology Law No. (22) of 2000 and its amendments.
- The New French Civil Code of 2016.

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