

Legal Effects of Contractual and Mandatory Insurance Liabilities in Smart Contracts under Iranian, Iraqi, and Egyptian Law

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Abstract

This study examines the insurance contract — an agreement under which one party (the insurer) undertakes, in exchange for a certain payment or payments from the other party (the insured), to compensate for incurred losses or to pay a specified sum. Accordingly, insurance functions as an effective mechanism for risk management and loss compensation. On the other hand, the use of smart technologies in this field facilitates information sharing, increases execution speed, simplifies utilization, reduces costs, saves time, and enables more efficient service delivery to citizens. The central question is to what extent this digitalization has been implemented, developed, or anticipated within the national laws of different countries. Based on this inquiry, the present article focuses on the legal frameworks governing smart insurance contracts in Iran, Iraq, and Egypt. The significance of this study lies in its comparative analysis of the legal structures in these three countries and its evaluation of how legal instruments are leveraged to advance smart insurance systems. The research method is descriptive-analytical. First, the existing legal provisions in each of the three jurisdictions are described, and then their differences and practical functions are analyzed. Findings indicate that all three countries have provided the necessary legal structures for delivering insurance services in key areas such as healthcare, general insurance services, motor insurance, and other critical sectors; however, the level of smart technology adoption varies. Iran is among the most advanced countries in the region regarding smart insurance, with its insurance companies widely utilizing digital technologies, smart contracts, and data analytics. In contrast, Iraq remains at the early stages of developing smart insurance compared to Iran and Egypt and still requires strengthening of technological infrastructure and expansion of digital systems.

Keywords: insurance contract, smart insurance, insurance liability, contractual insurance liability, mandatory insurance liability

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1. Introduction

Risk constitutes the most essential pillar of the insurance contract because it is the core subject of the agreement; without risk, the insurance contract cannot exist (Faraj; Sharaf al-Dīn, 1991). The significance of insurance as an effective instrument for confronting risks has become increasingly evident in light of the rapid acceleration of technological and industrial advancements (Abu al-Layl, 2020; Dehghani et al., 2022).

In this context, smart insurance contracts have emerged as an innovation in the insurance industry. These contracts are created and executed through blockchain technology and smart contracts (Abū al-Layl, 2020; Othman, 2021). Among their key features are:

- automatic performance of obligations;
- transparency and enhanced trust;
- cost reduction;
- high processing speed;
- programmability and personalized services (Abu al-Layl, 2020; Safar, 2006).

Overall, smart insurance contracts offer a modern paradigm for the insurance sector, improving efficiency, increasing transparency, and reducing operational costs (Dehghani et al., 2022; Wahbah & Muḥammad, 2020).

In the legal systems of Iran, Iraq, and Egypt, the insurance contract is regarded as one of the fundamental and vital agreements in personal and social life (Al-Ḥakīm, 2003; Al-Jammāl, 1999). Its importance has grown, especially in the current era of environmental and social transformation. Many jurists even classify the insurance contract among adhesion contracts, meaning agreements whose terms are typically drafted unilaterally, and to which individuals consent out of necessity and without negotiation (Qāsim, 2007; Sho'āriyān & Bigpūr, 2019).

Under Iraqi law, the legislator has dedicated a considerable portion of the Civil Code to the regulation of insurance contracts (Al-Dhanūn, 1976; Bayāt, 1962). Generally, the contract is considered consensual; however, because of its specific characteristics, it closely resembles adhesion contracts, making it subject to Articles 248 and 226 of the Iraqi Civil Code (Al-Khaykani).

Insurance in Iraq is an agreement between two parties:

- the insurer (mu'ammin), who undertakes, upon the occurrence of the insured risk or event, to pay a sum of money, a life annuity, or any other financial compensation; and
- the insured (mu'ammin lahu), who, in return, undertakes to pay the insurance premium (Faraj; Salīm, 2008).

The nature of this contract shows that insurance is not merely a simple personal relationship but rather an organized legal and economic mechanism with macro-level significance (Al-Jammāl, 1999; Barham).

2. Methods of Concluding Insurance Contracts

2.1. Elements of the Insurance Contract

The insurance contract is consensual because the Civil Code does not impose specific formalities for its validity (Faraj; Salīm, 2008). Therefore, the formation of this contract requires the general pillars of consensual agreements: mutual consent of the parties, the existence of a lawful subject matter, and a legitimate cause (Dehghani et al., 2022; Sho'āriyān & Bigpūr, 2019). Each of these conditions will now be examined in detail.

1. Consent (Tarāḍī)

The fundamental condition of consent is the genuine and mutual intention of the parties to form the contract — a meeting of wills aimed at creating a legal relationship, namely the insurance contract (Faraj; Sharaf al-Dīn, 1991). Accordingly, insurance cannot be concluded without real consent, which depends on the valid exchange of offer and acceptance. The declaration of intent must be made knowingly and freely to produce legal effects (Barham; Sho'āriyān & Bigpūr, 2019).

However, this will must be expressed by a person with legal capacity, meaning the individual is able to understand the legal consequences of their decision (Dehghani et al., 2022; Oudā & Habib, 2019). Additionally, the will must be free of defects such as mistake, duress, or fraud. Therefore, **legal capacity** and the **integrity of consent** are two essential prerequisites for valid agreement (Othman, 2021; Wahbah & Muḥammad, 2020).

2. Capacity (Ahlīyah)

Capacity refers to the legal ability of an individual to exercise rights and assume obligations (Al-Ḥakīm, 2003; Qāsim, 2007). In an insurance contract, both parties must have capacity. Typically, the insurer is a legal person authorized by law to operate within the insurance industry (Abu al-Layl, 2020; Fayyad, 2018). The insured, usually a natural person, must possess full capacity to manage property and legal affairs, as insurance is inherently risk-bearing and profit-and-loss oriented (Barham; Sho'āriyān & Bigpūr, 2019).

According to Article 106 of the Civil Code, the insured must have reached the legal age of 18 years. If the insured lacks full capacity and enters into an insurance contract without the permission of a guardian or trustee, the contract is non-effective (ghayr nāfidh) until ratified by the guardian or trustee (Bayāt, 1962; Khiyāl, 1998). Such approval must be explicit and specifically relate to the contract itself, not merely to its consequences (Al-Khaykani; Pourbour, 2021).

2.2. Types of Insurance Contracts and Related Regulations

1. Types of Insurance Contracts and Regulations in Iraq

The legal rules governing insurance contracts vary depending on the type of insurance because each type has its own method of risk transfer and management (Faraj; Sharaf al-Dīn, 1991). Among the recognized forms are cooperative insurance, personal insurance (self-insurance), commercial insurance, state insurance, full insurance, and partial insurance (Al-Jammāl, 1999; Salīm, 2008).

The fundamental distinction between full and partial insurance lies in the degree of financial coverage. In full insurance, the insured sum equals or exceeds the actual value of the insured property at the time of loss, obligating the insurer to compensate the entire damage (Al-Dhanūn, 1976). By contrast, in partial insurance, the insured sum is lower than the actual value of the property; thus, based on the principle of proportionality, the loss is apportioned between the insured and the insurer (Jabbār, 1986).

An insurance policy must also be drafted without ambiguity or defect because even minor vagueness can lead to significant legal disputes (Barham; Qāsim, 2007). A prominent example is the dispute involving British Petroleum (BP), where the company successfully claimed an additional USD 750 million due to ambiguous policy wording; under Texas law, any ambiguity in an insurance contract is construed in favor of the insured (Oudā & Habib, 2019).

Insurance policies also vary by field; for example, fire insurance differs from marine insurance. Other major forms include general accident insurance, engineering insurance, health insurance, life insurance, and automobile insurance (Faraj; Salīm, 2008). Among them, life insurance and fire insurance hold particular importance due to their direct connection with human life and individuals' economic security (Al-Ḥakīm, 2003; Dehghani et al., 2022).

2. Life Insurance

Life insurance has been known since Ancient Rome, and the first modern life policy was issued in 1653 AD (Faraj). With technological advancement and the development of actuarial science, life insurance expanded rapidly (Abu al-Layl, 2020; Fayyad, 2018).

This type of insurance provides financial security against contingencies such as premature death, old age, decreased income, and similar crises. If the insured lives beyond a specified term, funds are guaranteed for them; if they die earlier, benefits are paid to their beneficiaries (Salīm, 2008; Sho'āriyān & Bigpūr, 2019). Savings-based policies also allow the policyholder to obtain loans secured by the policy itself (Barham; Othman, 2021).

Under Article 997 of the Iraqi Civil Code, in a life insurance contract the insurer is obliged to pay a fixed amount to the heirs or other beneficiaries designated by the policyholder in case of the insured's death; in return, the insured undertakes to pay the premiums regularly (Al-Dhanūn, 1976; Bayāt, 1962).

Since life insurance may concern the life of the insured or a third party, in the latter case the written consent of the third party is mandatory at the time of contract conclusion, as required by Article 992 of the Iraqi Civil Code (Al-Khaykani; Pourbour, 2021). If the insured lacks capacity, such consent must be provided by their legal representative (Khiyāl, 1998).

Furthermore, if the insured intentionally causes the death of the policyholder or if the death results directly from their instigation, the insurer's obligations lapse. In cases of suicide, the insurer is not liable; however, under paragraph 2 of Article 993 of the Iraqi Civil Code, if the suicide is due to a mental illness that impaired the insured's will, the insurer remains bound to pay the full benefit (Abu al-Layl, 2020).

The policyholder may designate beneficiaries explicitly by naming them in the policy or implicitly by leaving it to default inheritance rules — in which case heirs qualify collectively without fixed shares. Paragraph 3 of Article 997 of the Iraqi Civil Code defines “spouse” and “children” as those who hold such status and inheritance rights at the time of the policyholder's death (Qāsim, 2007).

3. Fire Insurance

Fire insurance is one of the most important types, intended to cover damages and destruction of movable property — such as household goods and equipment — and immovable property — such as factories, business offices, and residential buildings — caused by fire (Faraj; Salīm, 2008). Coverage may also extend to perils like theft, explosion, storm, cyclone, flood, earthquake, strikes, consequential loss (e.g., lost profits), and damages from vehicle collisions (Al-Jammāl, 1999; Barham).

One of the insurer's key obligations is provided in Article 999 of the Iraqi Civil Code, which states:

“The insurer is liable for all damage directly caused by fire or unavoidably resulting from it.”

Thus, the insurer remains liable even if the insured property is lost or destroyed during the fire, unless it can be proven that the damage resulted from theft (Oudā & Habib, 2019). If the fire is caused by force majeure, the insurer is still responsible, but no liability exists if the fire was intentionally or fraudulently caused by the beneficiary (Othman, 2021; Wahbah & Muḥammad, 2020).

Where the intrinsic defect of the insured property caused the fire, the insurer must still compensate for the loss (Faraj). Additionally, if the insured property is mortgaged — whether by possessory mortgage, trust mortgage, or other real securities — the rights attached transfer to the insurance compensation. Therefore, the insurer cannot pay the indemnity to the policyholder without the consent of the creditors, as explicitly stated in paragraphs 1 and 2 of Article 1003 of the Iraqi Civil Code (Al-Khaykani; Pourbour, 2021).

Consequently, the insurer must verify before payment that the loss resulted from a fire occurring by chance or force majeure and that the beneficiary played no role in causing it (Qāsim, 2007). This principle has also been confirmed in Iraqi judicial practice; for example, the Court of Cassation of Iraq held that the National Insurance Company is not liable for damages caused by the burning of a moving vehicle since the loss resulted from collision or overturning, not from a covered fire peril (Bayāt, 1962).

3. The Smart Insurance Contract

3.1. The Legal Nature of the Smart Insurance Contract

The unique character and relative novelty of the smart contract in the legal domain require a careful analysis of its legal nature (Abū al-Layl, 2020; Dehghani et al., 2022). So far, no clear consensus has emerged on defining the legal status of these contracts, and multiple theories have been advanced.

Some scholars — particularly newcomers to digital technologies — argue that the smart contract is a substitute for traditional contracts; they view it as operating outside the jurisdiction of courts and enforceable only within the internet environment. This view, however, is largely inaccurate and closer to “conceptual idealism” than to legal reality (Othman, 2021; Sho'āriyān &

Bigpūr, 2019). Some enthusiasts go further and predict that smart contracts could replace lawyers or even statutory rules because they seem to create new, specialized obligations (Abu al-Layl, 2020; Wahbah & Muḥammad, 2020).

In practice, the development of smart contracts is unstoppable, as these instruments already play important roles in sectors such as energy and logistics and have measurable financial impact (Barham; Fayyad, 2018). Nonetheless, it must be emphasized that smart contracts are tools, not laws; their function is to automate enforcement of agreed terms, and they will evolve through use and real-world implementation (Abu al-Layl, 2020; Dehghani et al., 2022).

Smart contracts built on blockchain technology are essentially self-executing agreements, operating strictly on pre-coded data and protocols (Abū al-Layl, 2020; Oudā & Habib, 2019). This is visible in London-based companies that have launched platforms for implementing such agreements — digital versions of ordinary contracts, including real estate agreements, that execute automatically through programmed software lines. These platforms can even transfer funds, update ownership titles, and suspend payments at any moment (Othman, 2021).

It is therefore possible to translate smart contracts back into the format of traditional contracts for legal recognition. Current trends support broader use of smart contracts, especially in residential lease agreements, which are often adhesion contracts (Barham; Sho'āriyān & Bigpūr, 2019). A striking example is the city of Rotterdam in the Netherlands, which has officially adopted blockchain to register building leases, enabling faster and simpler contract formation (Abu al-Layl, 2020).

However, some argue the term “smart” is misleading because these contracts do not possess cognition or artificial intelligence; they merely automate pre-defined obligations once certain conditions are met (Yāser & al-Bābīlī, 2019). We maintain, however, that elements of artificial intelligence are indeed present — particularly when users interact via digital interfaces. In these cases, the user's role may be limited to offering assets (e.g., real estate) on blockchain networks, while the buyer pays through the platform and the smart contract system completes other steps: communicating with registrars, brokers, and financing banks (Othman, 2021; Oudā & Habib, 2019).

Although the process is automated, it leverages Internet of Things (IoT) connectivity, linking multiple institutions and enabling dynamic interactions. This makes smart contracts comparable to autonomous vehicles connected to IoT infrastructure to avoid accidents and interact with sensors, traffic signals, and safety systems (Yāser & al-Bābīlī, 2019).

The legal character of smart commercial contracts also becomes clearer when considering legislative experiences. For instance, the Virtual Assets Law of Dubai (2022) formally recognizes blockchain-based smart contracts but restricts their operation to licensed corporate entities (Abu al-Layl, 2020; Wahbah & Muḥammad, 2020). Article 2 defines distributed ledger technology (DLT) as a digital database — public or private — where transactions on virtual assets are recorded and verified through decentralized automated networks. Article 5 then targets business activities and investment attraction, meaning that UAE legislators envisage smart contracts primarily for investment and trade purposes but keep them under regulated company-based frameworks (Othman, 2021).

A major legal challenge arises regarding the relationship between users of smart contract platforms and the platform owner/regulator. If a technical or functional failure occurs — for example, the buyer pays but the platform fails to deliver a digital ownership certificate — who bears liability for breach or delay (Oudā & Habib, 2019; Pourbour, 2021)? Courts traditionally impose contractual liability for such losses.

To address this challenge, the legal nature of the relationship must be clarified: Is it an agency contract, brokerage, intermediation, or a contracting (*mutaqa'id/muqāwala*) agreement? Determining the correct conceptual framework directly affects the type of obligations each party assumes and the standards for breach (Al-Khaykani; Sho'āriyān & Bigpūr, 2019).

Legal logic also advises learning from countries that have practically deployed blockchain contracts — not to copy their laws wholesale but to adapt cautiously and contextually (Bayāt, 1962). Blind imitation may trap local systems in rigid electronic frameworks and create deep systemic vulnerabilities if foundational flaws emerge (Dehghani et al., 2022; Faraj).

3.2. Legal Safeguards in Smart Insurance Contracts

The implementation of blockchain-based smart contracts creates another significant legal challenge — the degree of statutory protection for general safeguards connected to the rights and claims of creditors of the contracting parties (Abū al-Layl, 2020; Dehghani et al., 2022). In our view, smart contracts may obstruct the exercise and enforcement of legitimate legal instruments that protect the fulfillment of obligations, such as:

- actions for declaring a contract fictitious or sham;
- actions for non-effectiveness;
- and even the oblique action (dā' wā ghayr mubāshira) by which a creditor exercises the debtor's rights on their behalf (Oudā & Habib, 2019; Sho'ariyān & Bigpūr, 2019).

Moreover, proving the right of pre-emption (ḥaqq al-shuf'ah) — one of the recognized modes of acquisition — can be difficult in the context of smart contracts (Bayāt, 1962). Questions also arise about the right to object for persons lacking capacity (such as interdicted individuals) or those legally barred from concluding sales contracts (such as certain judicial officers) (Al-Khaykani).

For instance, if a property sale is completed on a blockchain platform — restricted to designated parties and technology users — the transaction is finalized between seller and buyer without informing their creditors. Had the creditors been aware, they could have brought actions alleging sham transactions or, in the case of the seller's negligence or ultra vires acts, initiated an oblique action (Sho'ariyān & Bigpūr, 2019).

Suppose a co-owner with a right of pre-emption over a property listed on blockchain is unable to act because the legal time limit expires — complex legal disputes would arise (Bayāt, 1962).

One of the fundamental principles of blockchain technology is privacy preservation: awareness, supervision, and control over contract content and performance are restricted to what is necessary among the contracting parties themselves (Othman, 2021). This reflects public law tendencies asserting that non-contracting third parties (aside from the platform designer or intermediary) should have no direct role or impact on contract execution (Barham).

Technically, smart contract software is designed to ensure maximum confidentiality (Oudā & Habib, 2019; Safar, 2006). However, new legal mechanisms are needed to enable certain third parties — particularly creditors — to access basic information about existing smart contracts. Such transparency would safeguard their legal rights and preserve general enforcement guarantees to prevent debtor insolvency risks (Dehghani et al., 2022).

Accordingly, we propose that ownership-transferring smart contracts (e.g., sales and gifts) should be executed on public blockchain platforms where broader third-party participation as “observers” is possible. This would allow creditors with legitimate claims to monitor transactions and protect their rights (Abu al-Layl, 2020).

Looking at Egyptian legislation, Article 24/A/b of the 2022 Virtual Assets Regulation Law exempts public authorities from liability toward third parties for debts or obligations linked to digital activities, except in cases of fraud or gross fault (Othman, 2021; Wahbah & Muḥammad, 2020). The regulator responsible for supervising digital asset businesses bears no liability to third parties when acting within its official duties (Abū al-Layl, 2020).

We argue this limited protection for third parties — especially creditors — reflects an intrinsic feature of smart contracts, which are built on privacy and closed networks. Consequently, outsiders not recorded on the blockchain cannot easily access transaction records (Safar, 2006). The law presumes that any harm to third parties should be borne by companies engaged in virtual asset activities and using smart contracts, particularly those headquartered in Dubai; such companies are expected to indemnify affected contracting parties or third parties holding general claims (Dehghani et al., 2022).

In Iraqi law, referring to Article 78 governing smart contracts (2012), the following legal guarantees exist for smart insurance agreements (Al-Dhanūn, 1976; Faraj):

1. Regulatory framework

- Existence of laws and regulations governing the formation and performance of electronic and smart insurance contracts in Iraq.

- The supervisory role of the Iraq Insurance Regulatory Authority in issuing by-laws and executive instructions ([Barham](#)).
- 2. **Protection of stakeholder data**
 - Statutory and policy-based privacy and security safeguards for insured parties' personal data.
 - Insurers' obligation to keep sensitive beneficiary information confidential ([Oudā & Habib, 2019](#)).
- 3. **Liability and compensation**
 - Clear allocation of liability for breach of contract terms by either party.
 - Mechanisms for submitting claims and receiving due compensation ([Pourbour, 2021](#)).
- 4. **Dispute resolution**
 - Judicial and arbitral mechanisms to address conflicts between insurer and insured.
 - Enforcement of Iraq's current legal framework in insurance disputes ([Bayāt, 1962](#)).
- 5. **Monitoring and oversight**
 - Ongoing oversight by the Insurance Regulatory Board to ensure insurer compliance.
 - Authority to impose sanctions and penalties for violations of applicable regulations ([Sho'ariyān & Bigpūr, 2019](#)).

These foundational guarantees provide a baseline regulatory safety net for parties in smart insurance contracts in Iraq, although their practical details and enforceability depend on the current legal infrastructure and evolving regulatory practice.

4. Discussion and Conclusion

The findings of this study highlight that blockchain technology, despite being relatively new and not yet fully understood even among IT professionals, carries transformative potential for the insurance industry. Its integration can significantly change the operational and economic dynamics of the sector by reducing costs, accelerating claim settlement processes, enhancing transparency, and combating fraud. At the same time, the ecosystem built around blockchain creates new demands for insurance coverage, reflecting the natural relationship between technological advancement and risk management.

A key insight emerging from this research is that the use of smart contracts and decentralized software provides a reliable infrastructure for automating insurance applications and policy issuance while maintaining auditability. Automating these traditionally manual processes improves cost efficiency and could expand access to insurance by making policies more affordable and attractive. Greater competition among insurers is a likely consequence, pushing the market toward more innovative and client-centered services.

The concept of "insurance intelligence" also plays a central role. By embedding advanced digital technologies into the insurance value chain, companies can streamline processes, improve customer experience, and maintain stronger compliance. Blockchain stands out as the backbone of this transformation, providing a secure, transparent, and fast mechanism for executing obligations and sharing data among stakeholders. It enables the creation of tamper-resistant records, traceable transactions, and reliable verification of claims.

The comparative analysis between Egypt and Iraq shows a clear divergence in the pace and depth of this transformation. Egypt has advanced rapidly in digitalizing its insurance ecosystem. The country's companies widely employ online platforms, mobile applications, and smart contracts to offer services with greater speed and customization. Governmental e-services have simplified administrative processes, cut costs, and encouraged digital adoption. Moreover, the use of big data analytics has empowered Egyptian insurers to manage risk more effectively and design innovative, market-driven insurance products.

In contrast, Iraq remains at the early stages of adopting smart insurance solutions. While there are efforts to introduce digital management systems and to educate and train staff, the pace of modernization is slower due to limitations in technological infrastructure and regulatory maturity. Iraq's insurance industry still requires substantial investment in both digital systems and human capital to match the global trend toward intelligent and blockchain-enabled insurance.

Legal frameworks have a decisive impact on how these innovations are implemented. Iraq's Civil Code provides a base for insurance regulation, especially through Articles 983 to 1007, but much of the adaptation to new technological realities depends on supplementary, specialized laws. The legislator has taken steps to protect policyholders and respond to emerging risks,

particularly in transport, by introducing updated mandatory insurance provisions. However, the existing structure needs further modernization to fully accommodate blockchain-based insurance transactions and to ensure adequate legal safeguards for all parties involved.

Egypt's approach, by contrast, shows a more comprehensive legal readiness for digital transformation. Its clear regulations on electronic contracts, data protection, and licensing of insurers, alongside the government's active role in digital services, have created a more enabling environment. This has contributed directly to the rapid growth of smart and digital insurance solutions and improved customer protection and transparency.

This study underscores the profound impact that blockchain and smart contracts can have on the insurance industry by making processes faster, cheaper, and more transparent while reducing fraud and increasing trust. The concept of insurance intelligence represents an essential evolution toward smarter and more resilient financial protection systems. Egypt's experience demonstrates how aligning technological adoption with supportive legislation and government initiatives can accelerate industry modernization and enhance customer value. Iraq's path shows the importance of building a robust regulatory and technological foundation to enable the safe and effective use of emerging tools.

By clarifying legal frameworks, investing in infrastructure, and fostering digital literacy, countries can harness the potential of blockchain and smart insurance to meet modern market demands and protect stakeholders effectively. Developing adaptive legal systems that respond to technological change will ensure that the benefits of smart insurance — efficiency, transparency, and secure data management — are fully realized while mitigating risks and preserving fundamental rights such as creditor protection and fair access to legal remedies.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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