

The Legal Characterization of Smart Contracts and Its Effect on Contract Formation and Performance under Jordanian Civil Law

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Abstract

Smart contracts expose a fundamental distinction between **technical execution** and **legal enforceability**. A blockchain program may transfer an asset automatically, yet that fact does not by itself establish a valid contract, an effective discharge, or immunity from judicial remedies. This research examines the legal characterization of smart contracts and the consequences of that characterization for contract formation and performance under Jordanian civil law, comparatively with Egyptian law. It adopts a doctrinal, analytical, and functional method grounded in the Jordanian Civil Code No. 43 of 1976, the Jordanian Electronic Transactions Law No. 15 of 2015 as amended by Law No. 1 of 2026, the Egyptian Civil Code No. 131 of 1948, and the Egyptian Electronic Signature Law No. 15 of 2004. The analysis is supported by peer-reviewed literature whose digital object identifiers were verified at publisher or journal pages.

The study argues that "smart contract" is not a unitary legal category. Three situations must be separated: **operational code** lacking the elements of a legal agreement; **an automated performance mechanism** implementing a separately formed agreement; and a **smart legal contract** in which code, alone or together with natural language, embodies legally attributable consent and the essential terms of a transaction. In both Jordan and Egypt, the underlying transaction retains its ordinary legal characterization, while code normally operates as a medium of expression, evidence, or performance. Both systems can therefore recognize many smart legal contracts through technologically neutral rules on consent and electronic writing. Jordan has the clearer statutory rule on automated electronic agents and attribution; Egypt provides a particularly important judicial power to adjust an obligation made excessively onerous by exceptional general circumstances.

The research concludes that automation does not displace capacity, defects of consent, mandatory form, good faith, force majeure, dissolution, restitution, or damages. Blockchain immutability is an operational feature, not a rule of private law. The most legally robust model is consequently a dual-layer instrument linking readable legal terms to audited code, identifying the controlling version, defining blockchain finality, allocating oracle and coding risks, and preserving pause, correction, restitution, and dispute-resolution mechanisms.

Keywords: smart contracts; blockchain; legal characterization; contract formation; automated performance; Jordanian Civil Code; Egyptian Civil Code; electronic transactions; electronic signature; restitution.

1. Introduction

The expression "smart contract" is misleading if it is read as a conclusion rather than a question. In computing, the expression commonly denotes code deployed on a distributed ledger and executed when programmed conditions are satisfied. In law, however, a contract is a juridical relationship created by concordant, legally attributable wills and governed by rules that extend beyond the literal instructions selected by the parties. The same program may therefore be a technical component of a legal contract in one transaction, a complete medium for concluding and performing an agreement in another, and merely software in a third.

Scholarly concern about this terminological instability is well established. Mik cautions that technical elegance does not make a system commercially useful or legally viable and rejects the assumption that all contractual complexity can be reduced to code (Mik, 2017). Levy similarly demonstrates that contracts operate as social and relational resources, including through deliberate incompleteness, selective enforcement, and context-dependent accommodation that deterministic code may suppress (Levy, 2017). More recent civil-law scholarship distinguishes smart-contract code from a legally binding smart contract and proposes hybrid "contracts on chain" capable of connecting natural-language safeguards, verified identity, negotiation, performance, and dispute resolution (Bassan & Rabitti, 2024).

The issue is particularly significant in Jordan and Egypt. Each jurisdiction possesses a mature civil code and legislation recognizing electronic writing or electronic transactions, yet neither civil code was drafted for a distributed ledger whose entries may be globally replicated, pseudonymous, automatically executed, and difficult to reverse. Jordanian scholarship has accordingly concluded that existing electronic-contracting rules provide a foundation but leave blockchain-specific gaps (Qutieshat et al., 2023). Egyptian scholarship likewise treats the ordinary Civil Code as capable of supplying a jurisprudential foundation while emphasizing tensions concerning consent, termination, and dispute resolution (Ibrahim Abdel Nabi & Abdalla Abdelkarim, 2025).

Central proposition: A smart contract's legal effect cannot be inferred from its label or from successful execution of code. It must be derived from the legal character of the underlying

transaction, the presence of ordinary requirements of formation and validity, the electronic-evidence regime, and the continuing application of mandatory rules on performance and remedies.

This study is current to **25 August 2026**. It incorporates Jordanian Law No. 1 of 2026, which entered into force on 3 March 2026 and broadened the application of the Electronic Transactions Law while reinforcing the written-evidence effect of electronic information and records (Sadek, 2026).

2. Research Problem, Questions, and Method

The research problem arises from the collision of two forms of normativity. Blockchain code determines what a system will execute. Civil law determines what parties legally owe, whether their apparent consent is valid, and what consequences follow when execution produces an unlawful or unintended result. The problem is not solved by declaring "code is law," because code cannot repeal capacity, public order, good faith, or judicial remedies. Nor is it solved by treating code as legally irrelevant, because electronic messages, signatures, and automated agents can carry legally effective declarations and performance.

Research question	Analytical focus
How should a smart contract be legally characterized?	Contract, performance mechanism, software, or a layered hybrid.
Can code or an on-chain transaction constitute offer and acceptance?	Expression of will, attribution, knowledge or issuance, identity, capacity, and mandatory form.
When is a blockchain transaction legally effective?	Dispatch, receipt, knowledge, acceptance, validation, and contractual definition of finality.
Does automatic execution amount to complete legal performance?	Good faith, implied duties, external facts, oracles, force majeure, hardship, and non-performance.
Can an immutable transfer be rescinded or reversed in law?	Dissolution, restitution, reverse transactions, equivalent value, unjust enrichment, and damages.
What are the principal differences between Jordan and Egypt?	Jordanian automated-agent attribution and 2026 reform; Egyptian hardship adjustment and differing formation defaults.

The research uses a **doctrinal and analytical comparative method**. Primary legislation is read functionally against the technical stages of a smart-contract transaction: design, assent, deployment, triggering input, execution, and post-execution remedy. Secondary literature is used to clarify technical limitations and legal classifications, not to replace the statutory text. Because no verified body of Jordanian or Egyptian appellate judgments squarely applying these rules to blockchain smart contracts was identified, the conclusions are doctrinal rather than predictive of a settled judicial line.

The comparison is also deliberately limited. It addresses the general civil-law framework rather than sector-specific rules governing securities, banking, public procurement, consumer finance, virtual assets, data protection, taxation, or criminal liability. Those regimes may impose additional validity, authorization, disclosure, or public-order constraints.

3. Concept and Technical-Legal Typology

A smart contract can be described technically as code that reads defined inputs and produces defined outputs, commonly on a blockchain. The phrase does not establish whether the code contains promises, whether identifiable parties intended legal consequences, or whether the programmed outcome corresponds to a lawful obligation. Mik therefore treats terminological discipline as essential and emphasizes that only some obligations are suitable for reliable automation (Mik, 2017). Bassan and Rabitti likewise explain that smart-contract code, smart legal contracts, and broader contracts-on-chain perform different functions (Bassan & Rabitti, 2024).

Tier	Description	Legal consequence
I. Operational code	A program performs a function without recording all elements of a legally binding agreement.	The code is software. Contractual liability may arise from another relationship, such as development, platform, custody, or service terms.
II. Automated performance mechanism	Code performs one or more obligations created by an off-chain or natural-language agreement.	The prose agreement governs formation; the code is attributable performance, subject to interpretation, good faith, and remedies.
III. Smart legal contract	Code, alone or linked to prose, embodies concordant will and the essential terms of a lawful transaction.	The code can participate in formation and performance if ordinary civil and electronic requirements are satisfied.

This three-tier classification avoids two errors. The first is **technological essentialism**: assuming that every deployed program is a contract. The second is **legal formalism detached from practice**: assuming that code can never express or evidence consent. De Caria's analysis supports the use of established legal categories rather than an automatic demand for an entirely new juridical institution (De Caria, 2018). Jordanian scholarship reaches a compatible conclusion by testing smart contracts against the ordinary elements of mutual consent, subject matter, lawful cause, and formality (Aburoub et al., 2025).

The decisive legal characterization should consequently follow two steps. First, the jurist identifies the **underlying transaction**-for example, sale, lease, insurance, escrow, agency, or payment. Second, the jurist determines the **role of code** in that transaction: communication, evidence, formation, performance, security, or remedy. The smart feature does not erase the underlying nominate or innominate contract.

4. Legislative Framework

4.1 Jordan

The Jordanian Civil Code No. 43 of 1976 supplies the general rules. Article 87 defines a contract through the connection of an offer by one party with acceptance by the other and their concurrence in a

manner that produces an effect on the subject matter and binds each party. Article 90 provides that the contract is concluded when offer and acceptance are connected, subject to any additional form prescribed by law. Article 93 recognizes expression by speech, writing, customary gesture, exchange of conduct indicating consent, or any behavior that leaves no doubt as to assent.

The Electronic Transactions Law No. 15 of 2015 creates the direct electronic bridge. Article 2 includes a contract within the concept of an electronic record and defines an electronic intermediary as software used automatically to generate, send, or receive an information message. Articles 6-8 recognize accessible, storable, and sufficiently integral records as writing or an original. Article 9 recognizes an information message as a legally admissible means of expressing offer or acceptance. Most importantly for automation, Article 10 attributes an information message to the originator when it is sent by the originator, a representative, or an electronic intermediary programmed to act automatically in the originator's name or on the originator's behalf.

Jordanian provision	Relevance to smart contracts
Civil Code arts. 87, 90, 93	Concordant offer and acceptance; technologically neutral expression of will.
Civil Code arts. 101-102	Time and place for parties not sharing one contracting session and for telephone or similar methods.
Civil Code arts. 143-145, 151-153	Fraudulent inducement and legally relevant mistake, including mistake in the contract's nature or object.
Civil Code art. 202	Performance according to the contract, good faith, and implications of law, custom, and the transaction's nature.
Civil Code arts. 245-249	Agreed dissolution, judicial dissolution, impossibility, restoration, and reciprocal retention.
Electronic Transactions Law arts. 2, 6-10	Electronic records, functional equivalence, electronic offer/acceptance, and automated-agent attribution.
Electronic Transactions Law arts. 12-17	Acknowledgment, dispatch, receipt, place, signature security, authentication, and evidentiary weight.
Law No. 1 of 2026	Broader scope, written-evidence effect, and updated authentication authority.

Law No. 1 of 2026 replaced the former restrictive approach to exclusions with a broader rule applying the Electronic Transactions Law to electronic transactions insofar as this does not conflict with special legislation. It also strengthened Article 9 by confirming the force of written evidence for electronic information and records and updated the competent public authentication authority (Sadek, 2026). The reform enlarges the legal space for smart-contract use, but does not abolish constitutive form, registration, notarization, public-order, or sectoral requirements imposed by special law.

4.2 Egypt

The Egyptian Civil Code No. 131 of 1948 follows a closely related structure. Article 89 concludes the contract when parties exchange concordant expressions of consent, subject to legal formalities. Article 90 permits expression orally, in writing, by customary gesture, or by conduct leaving no doubt as to

meaning, and permits implied expression unless law or agreement requires an express form. Article 91 makes a declaration effective when it comes to the addressee's knowledge, with arrival creating a presumption of knowledge. Article 97 places formation between absent parties at the time and place where the offeror becomes aware of acceptance, unless agreement or law provides otherwise.

Egyptian Electronic Signature Law No. 15 of 2004 defines electronic writing, electronically written messages, and electronic signatures. Article 14 gives compliant e-signatures in civil, commercial, and administrative transactions the same determinative effect as conventional signatures under the Evidence Law, subject to the statute and its executive technical rules. The statute validates medium and evidence, but it does not expressly regulate automatic-message attribution with the same clarity as Jordanian Article 10.

Egyptian provision	Relevance to smart contracts
Civil Code arts. 89-91, 97	Concordant consent, means of expression, effectiveness upon knowledge, and absent-party formation.
Civil Code arts. 120-125	Mistake, fraud, and defects of consent.
Civil Code arts. 147-148	Binding force, judicial hardship adjustment, good faith, and implied obligations.
Civil Code arts. 157-161	Dissolution, express dissolution, impossibility, restoration, and reciprocal withholding.
Civil Code arts. 215-217	Compensation, creditor contribution, foreign cause, force majeure, and risk allocation.
Electronic Signature Law art. 1	Definitions of electronic writing, message, signature, signer, and certificate.
Electronic Signature Law art. 14	Evidentiary equivalence for compliant electronic signatures.

Egypt's framework therefore permits code and electronic messages to operate within ordinary contract doctrine, but the validity of a specific smart contract depends on proof of identity, attribution, capacity, assent, object, lawful purpose, and any applicable form. Ibrahim Abdel Nabi and Abdalla Abdelkarim accordingly argue for integration through established Egyptian doctrine rather than treating software execution as a self-contained normative system (Ibrahim Abdel Nabi & Abdalla Abdelkarim, 2025).

5. Effect of Legal Characterization on Contract Formation

5.1 Offer and Acceptance Through Code

If code is only a performance mechanism, it does not need to contain the original offer and acceptance; formation is located in the external agreement. If the asserted contract is concluded on chain, however, the deploying or calling transaction must communicate sufficiently definite terms and a present intention to be legally bound. The receiving act must correspond to those terms.

Jordanian Civil Code Article 93 and Electronic Transactions Law Article 9 make the recognition of an on-chain declaration doctrinally straightforward. Writing, conduct, and information messages can express will. Egyptian Civil Code Article 90 is similarly medium-neutral. Neither system requires natural language as such. Yet technological possibility is not the same as factual proof. A hexadecimal call to an unaudited program may be effective conduct for a sophisticated participant who understood the transaction, while it may be inadequate evidence of informed assent where a consumer saw only a misleading interface.

Rule of analysis: Code can express assent, but the legal meaning of an on-chain action depends on the interface, disclosed terms, party sophistication, transaction context, and the relationship between readable terms and executable code.

This is why a "code-only" model is fragile. The code may precisely define machine instructions while remaining incapable of communicating legally evaluative standards such as reasonable efforts, material breach, good faith, or excessive hardship. Levy's socio-legal critique is especially relevant: useful contracts often preserve space for accommodation and non-enforcement that automatic systems intentionally remove (Levy, 2017).

5.2 Automated Electronic Agents and Attribution

Jordan provides a decisive statutory rule. Article 10 of the Electronic Transactions Law attributes a message sent by an electronic intermediary programmed to work automatically in the originator's name or on the originator's behalf. The legally relevant intention is therefore traced to the person who configured, authorized, or used the system, not to an independent will supposedly possessed by the software.

Egypt lacks an equally express general provision in Law No. 15 of 2004. Attribution must be reasoned through ordinary doctrine, the identity associated with a compliant electronic signature, representation where applicable, and the risk created by placing an automated system into commerce. Papadouli and Papakonstantinou's treatment of autonomous systems as tools or agents whose operation is attributed to a human user offers an analytically useful approach, although the precise Egyptian result remains a matter for national doctrine (Papadouli & Papakonstantinou, 2023).

Attribution question	Jordan	Egypt
Is an automated message expressly contemplated?	Yes. "Electronic intermediary" is defined, and Article 10 attributes its message.	Not with equivalent clarity in the general e-signature statute.
Does cryptographic control prove legal identity?	No. It proves control of a key; statutory identity and evidence conditions remain.	No. Article 14 equivalence depends on technical and regulatory requirements.
Who bears programming risk?	Presumptively the originator under attribution, subject to consent defects, causation, contract allocation, and provider liability.	Determined through ordinary attribution, representation, contract, fault, and causation principles.

Reform priority	Add a specific electronic-agent error and correction rule.	Add both express automated-agent attribution and an error/correction rule.
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The principal reform need is not to confer personality upon software. It is to clarify when a user may avoid an automated transaction caused by input error, unauthorized use, corrupted code, or an output that materially departs from the parameters the user authorized.

5.3 Time and Place of Formation

Distributed ledgers generate several possible moments: user signature, broadcast to the network, entry into a node's mempool, inclusion in a proposed block, validation, and a chosen level of finality. Civil law selects a legally relevant communication event, not a technological event in the abstract.

Jordanian Civil Code Article 101 deems a contract between absent parties formed at the place and time where acceptance is issued, unless agreement or law provides otherwise. Articles 13 and 14 of the Electronic Transactions Law separately define dispatch, receipt, and their places. Egyptian Civil Code Articles 91 and 97 emphasize the offeror's knowledge of acceptance, while receipt creates a presumption of knowledge.

The default rules therefore differ. A court should not mechanically equate "block inclusion" with both Jordanian issuance and Egyptian knowledge. The safer drafting solution is an express finality clause identifying the event that constitutes acceptance, the number or type of confirmations required, the governing timezone, the effect of a chain reorganization, and the rule for competing transactions.

5.4 Capacity, Identity, and Pseudonymity

A blockchain address has technical agency but no intrinsic civil status. Control of a private key does not establish age, mental capacity, authority to bind a company, or freedom from interdiction. Aburoub and colleagues identify verification of mutual consent and digital identity as a principal challenge under Jordanian law and recommend integration of electronic signatures and identity tools (Aburoub et al., 2025).

Technical fact	What it can prove	What it cannot prove without additional evidence
Valid private-key signature	Control of a cryptographic credential at a given time.	Civil identity, age, mental capacity, corporate authority, absence of coercion.
Blockchain timestamp	A transaction or hash was recorded by a network at or before a time.	That a party read or understood incorporated terms.
Immutable code hash	The referenced code has not changed.	That the code correctly expresses the parties' agreement or is lawful.
Successful execution	Programmed conditions were satisfied according to the system.	Legal validity, proper performance, good faith, or absence of an oracle error.

In both systems, high-value smart legal contracts should connect wallet credentials to reliable identity and authority evidence. Consumer transactions require accessible disclosure and a demonstrable opportunity to review terms. Permissioned onboarding, official digital identity, organizational signing authority, and age or capacity controls can reduce risk, but they do not eliminate doctrines protecting defective consent.

5.5 Mistake, Fraud, and Code-Prose Divergence

Jordanian Civil Code Articles 143-145 address fraudulent inducement, including intentional silence in circumstances where disclosure was decisive, while Articles 151-153 address mistake. Article 152 treats mistake in the nature of the contract, a condition of formation, or the subject matter as destructive of the contract; Article 153 permits dissolution for mistake in a desired quality or the other party's identity or quality. Egyptian Civil Code Articles 120-125 likewise preserve mistake and fraud doctrine.

Automation does not remove these defects. It may intensify them. A party may misunderstand the legal effect of a transaction, the interface may misdescribe the code, a programmer may mistranslate prose, or an oracle may provide a false fact. Mik emphasizes that translation between natural language, business meaning, and executable semantics is a substantive constraint, not a cosmetic drafting exercise (Mik, 2017).

Three conflicts should be distinguished. First, where prose governs and code merely performs it, erroneous execution is non-performance of the prose obligation. Second, where the parties expressly designate audited code as controlling, the code is powerful evidence of agreed mechanics, but mandatory rules and defects of consent still apply. Third, where a user assents through an interface without meaningful access to either readable terms or intelligible consequences, formation itself may be contested.

5.6 Form and Evidentiary Effect

Jordanian Articles 6-8 of the Electronic Transactions Law use functional equivalence: electronic records can satisfy writing and original requirements where they remain accessible, storable, integral, and attributable. The 2026 amendment further confirms the written-evidence force of electronic information and records (Sadek, 2026). Egyptian Article 14 grants equivalent determinative effect to a compliant e-signature, subject to the executive technical rules.

Neither regime converts every cryptographic signature into a legally protected or authenticated electronic signature. Nor does electronic equivalence override special legislation requiring public registration, notarization, or a particular official record. The legal effect of a smart contract must therefore be tested transaction by transaction.

6. Effect of Legal Characterization on Performance

6.1 Automatic Execution Is Not Necessarily Legal Performance

When code transfers an asset exactly as programmed, it has achieved **technical execution**. Legal performance requires conformity with the legally owed obligation. The two coincide only where the code accurately represents a valid obligation, receives reliable inputs, and operates consistently with mandatory and implied duties.

Jordanian Civil Code Article 202 requires performance according to the contract and in a manner consistent with good faith; it also extends the contract to consequences arising from law, custom, and the transaction's nature. Egyptian Civil Code Article 148 contains a closely analogous rule, referring to law, custom, equity, and the nature of the obligation. Code cannot exclude these implications merely by omitting them.

The distinction is especially important for qualitative obligations. A program can release payment on receipt of a signed delivery event, but it cannot autonomously determine whether goods conform to a legally implied quality standard unless trustworthy data and a legally adequate evaluation process are supplied. Papadouli and Papakonstantinou note that terms such as good faith, best endeavors, or reasonableness demand qualitative judgment and are poorly suited to direct automation (Papadouli & Papakonstantinou, 2023).

6.2 Non-Performance and Dissolution

Jordanian Article 246 permits a party to a reciprocal contract, after notice, to demand performance or dissolution when the other party fails to perform; the court may order performance, grant time, dissolve, and award compensation. Article 245 permits an agreement that non-performance automatically dissolves the contract but ordinarily preserves notice unless expressly waived.

Egyptian Article 157 likewise permits performance or dissolution after notice and allows the court to grant time or refuse dissolution when the breach is minor in relation to the whole contract. Article 158 governs express dissolution clauses. These provisions show why a coded "self-destruct" or termination function cannot be evaluated solely by its technical success. The legal questions include whether the triggering breach occurred, whether notice or cure was required, whether the breach was sufficiently material, and whether the clause contravenes mandatory protection.

Failure mode	Possible legal characterization
Party never funds the contract	Ordinary non-performance or failure of a condition, depending on structure.
Code contains a defect and underpays	Defective performance by the responsible party; possible developer or provider liability under a separate relationship.

Oracle reports a false event	Breach, unjust enrichment, voidability, or non-formation, depending on the oracle's role.
Network congestion causes delay	Delay, possible foreign cause, or allocated infrastructure risk.
Off-chain delivery is defective but oracle says "delivered"	Technical execution without complete legal performance.
Contract is dissolved after an irreversible transfer	Restitution by reverse transfer, equivalent value, tracing, or damages.

DiMatteo and Poncibò reject the claim that self-enforcement makes remedies obsolete. Legality, public policy, and contract-policing doctrines remain relevant, while courts and tribunals may still grant post hoc relief. They recommend internal proactive and reactive measures, but treat ordinary contract remedies as continuing default law (DiMatteo & Poncibò, 2018).

6.3 Force Majeure, Impossibility, and Hardship

Jordanian Civil Code Article 247 provides that, in reciprocal contracts, force majeure that makes performance impossible extinguishes the corresponding obligation and dissolves the contract automatically, with rules for partial and temporary impossibility. Egyptian Article 159 similarly extinguishes reciprocal obligations and automatically dissolves the contract when impossibility extinguishes one obligation. Articles 215 and 217 address compensation, foreign cause, and contractual allocation of unforeseen-event or force-majeure risk.

An oracle can supply weather data, a government order, or a market event; it cannot conclusively determine the legal classification of that fact as force majeure. That classification may require unforeseeability, externality, causal effect, impossibility, mitigation, notice, and contractual risk allocation. A robust design should therefore treat relevant data as a **trigger for review or temporary suspension**, not as a substitute for legal judgment.

Egypt contains an additional rule of major comparative importance. Article 147(2) authorizes the court, after balancing the parties' interests, to reduce an obligation to a reasonable level when exceptional, unforeseeable general circumstances make performance excessively onerous, though not impossible, and threaten grave loss. This hardship rule directly contradicts the idea that unstoppable literal execution must always prevail. A smart contract governed by Egyptian law should preserve a route for suspension and judicial adjustment. Jordanian law also subjects performance to good faith and other applicable doctrines, but the verified core provisions do not contain a directly equivalent general hardship formula as explicit as Egyptian Article 147(2).

6.4 Oracle Failure

Oracles connect deterministic code to off-chain facts. They are therefore points of both utility and vulnerability. Papadouli and Papakonstantinou classify oracle failure as capable of producing four legally distinct situations: breach of a smart contract; unjust enrichment; conclusion of a voidable

contract that should not have been concluded; or non-conclusion of a contract that should have arisen (Papadouli & Papakonstantinou, 2023).

Oracle governance question	Recommended contractual answer
Who selects and controls the source?	Identify the provider, selection authority, independence obligations, and conflicts.
What data is authoritative?	Define source hierarchy, time, units, aggregation, and treatment of missing or contradictory data.
What degree of certainty triggers execution?	Use thresholds, multiple-source consensus, and review for legally evaluative events.
Who bears false-data risk?	Allocate risk subject to mandatory law, provider fault, causation, and public policy.
What happens on outage or anomaly?	Pause, fallback oracle, manual review, time extension, or escrow retention.
Can the result be challenged?	Provide an accessible dispute procedure and preserve judicial or arbitral relief.

Neither Jordanian nor Egyptian legislation presently supplies a blockchain-specific oracle-liability regime. Liability must be constructed from the parties' contract, the oracle provider's obligations, attribution, causation, fault or foreign cause, unjust enrichment, and non-contractual liability. This gap justifies targeted legislation or regulatory standards, but not abandonment of ordinary civil doctrine.

6.5 Immutability, Dissolution, and Restitution

Blockchain immutability is frequently overstated. It generally means that an accepted historical entry is difficult to delete or rewrite. It does not mean that a court cannot declare the underlying transaction void, avoidable, dissolved, or productive of a restitutionary obligation.

Jordanian Article 248 requires restoration of the parties to the position preceding dissolution and substitutes compensation where restoration is impossible. Article 249 coordinates reciprocal return through a right of retention. Egyptian Article 160 similarly restores the parties to their pre-contract position and permits compensation where restoration is impossible.

The technical ledger need not be erased to implement these rules. Restitution can take the form of a new reverse transaction, transfer of an equivalent asset, delivery of fiat value, tracing into substituted assets, or compensation. The original block remains evidence that the first transfer occurred; a second legally compelled transfer records the remedy. The real challenge is practical-identity, control of assets, insolvency, cross-border enforcement, or loss to a good-faith third party-not conceptual incompatibility between blockchain and restitution.

6.6 Damages and Internal Remedies

Jordanian Article 363 permits the court to assess compensation by actual loss where neither law nor contract fixes it, while Article 364 allows agreed compensation subject to legal control. Egyptian

Articles 215-217 address compensation for impossible performance or delay, creditor contribution, foreign cause, force majeure, and limits on exemption for fraud or gross negligence.

A smart contract can automatically release a predetermined amount, but such a payment is not necessarily the final legal measure of damages. The clause may be recharacterized or adjusted under mandatory law; actual consequential loss may exceed the coded amount; and the creditor's contribution, mitigation, causation, or invalid limitation clauses may require judicial assessment.

Internal remedies remain valuable when they are designed as **risk controls rather than replacements for law**. Examples include escrow, staged release, a cure period, a pause switch, a multi-signature emergency function, upgradeable modules, reverse-transaction authority, and a dispute flag that prevents dissipation. The power to activate these mechanisms must be transparent and constrained, or the design merely reintroduces an unaccountable intermediary.

7. Comparative Evaluation

Jordanian and Egyptian law converge more than they diverge. Both legal systems can recognize electronically expressed consent; both require capacity, lawful and sufficiently defined content, and valid consent; both impose good faith and obligations implied beyond literal text; and both preserve dissolution, restitution, and damages. The strongest doctrinal conclusion is therefore one of **adaptation, not displacement**.

Dimension	Jordanian position	Egyptian position	Comparative assessment
Electronic offer and acceptance	Explicitly recognized by ETL Article 9.	Reached through Civil Code consent rules plus e-writing/e-signature evidence.	Jordan is more express.
Automated-agent attribution	Explicit in ETL Article 10.	No equivalent general rule identified in Law No. 15/2004.	Jordan has a clearer statutory basis.
Electronic evidence	Functional equivalence for records, originals, signatures; reinforced in 2026.	E-signature and electronic-writing equivalence subject to regulatory requirements.	Both recognize electronic evidence through different statutory structures.
Formation between absent parties	Issuance-oriented Civil Code rule, supplemented by ETL dispatch/receipt provisions.	Knowledge-oriented rule with receipt presumption.	Express blockchain-finality drafting is essential.
Good faith and implied content	Civil Code Article 202.	Civil Code Article 148.	Strong substantive convergence.
Hardship	Good faith and applicable doctrines; no equally explicit general rule verified in the core matrix.	Express judicial adjustment under Article 147(2).	Egypt provides a clearer direct response to excessive onerousness.
Impossibility and dissolution	Articles 247-249.	Articles 159-161.	Substantial convergence.

Blockchain-specific legislation	No comprehensive dedicated statute; 2026 electronic reform is significant.	No comprehensive dedicated civil statute.	Both would benefit from targeted, technology-neutral clarification.
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Jordanian electronic legislation is thus comparatively stronger at the **formation infrastructure** level, especially attribution to an automated intermediary. Egyptian civil law is comparatively explicit at the **post-formation adjustment** level through the hardship power in Article 147(2). Neither difference justifies a new universal "smart contract" category. They instead identify where each system requires careful contractual architecture and possible statutory refinement.

8. Proposed Legal Model

The recommended model is a **dual-layer smart legal contract**. The natural-language layer should state the parties, authority, object, price or determinable method, applicable law, readable obligations, mandatory disclosures, and dispute rules. The code layer should implement only those obligations suited to deterministic execution. The two layers should be connected by a code hash, version identifier, audit report, and a precedence clause.

Required element	Function
Identity and authority record	Connects wallets to civil identity, capacity, and representative power.
Human-readable terms	Supports informed consent, interpretation, consumer disclosure, and judicial review.
Code hash and version	Identifies the exact executable object and prevents silent substitution.
Code-prose precedence rule	Determines the legal response to inconsistency without excluding mandatory law.
Formation/finality clause	Selects the operative event for acceptance and addresses chain reorganization.
Oracle schedule	Identifies sources, thresholds, fallback, audit, and allocation of data risk.
Pause, cure, and correction functions	Prevents disputed or anomalous execution from becoming practically irreversible.
Restitution mechanism	Enables reverse transfer or escrow recovery after invalidity or dissolution.
Governing law and forum	Reduces uncertainty created by distributed nodes and pseudonymous access.
Evidence and audit archive	Preserves interfaces, disclosures, signatures, code, inputs, and execution logs.

The model deliberately rejects absolute autonomy. A smart legal contract should be **automated where certainty is valuable and reviewable where judgment is necessary**. Bassan and Rabitti's contracts-on-chain model supports this modular approach by integrating negotiation, identification, performance,

and dispute resolution rather than treating a single code file as the entire legal relationship (Bassan & Rabitti, 2024).

9. Legislative and Policy Recommendations

Jordan and Egypt should adopt targeted, technology-neutral provisions rather than a rigid blockchain statute likely to become obsolete. The statute should define functional categories, preserve existing civil remedies, and clarify the evidentiary and attribution questions created by automated systems.

Recommendation	Jordan	Egypt	Rationale
Define "smart-contract code" and "smart legal contract" separately.	High	High	Prevents software from being presumed contractual and avoids denying legal effect to valid code-based assent.
Preserve characterization of the underlying transaction.	High	High	Sale, insurance, lease, escrow, and other rules remain controlling.
Add an electronic-agent error and correction rule.	High	Very high	Jordan has attribution but needs a tailored error rule; Egypt needs both attribution and error clarification.
Define a default blockchain formation/finality event, subject to agreement.	High	High	Resolves uncertainty among signature, broadcast, block inclusion, and finality.
Require human-readable consumer terms and explicit disclosure of automation.	Very high	Very high	Supports informed consent and controls unfair surprise.
Recognize coded pause, correction, upgrade, and reverse-transfer mechanisms.	High	High	Makes civil remedies practically implementable without erasing ledger history.
Establish oracle governance and provider accountability standards.	Very high	Very high	Off-chain data is a principal source of legal and operational failure.
Connect approved identity credentials with capacity and authority evidence.	High	High	A wallet key alone does not establish civil status or representation.
Preserve courts' power over public order, good faith, hardship, restitution, and damages.	Very high	Very high	Technical execution cannot override mandatory private law.

For Jordan, future guidance should build on the 2026 reform and Articles 9-10 by explaining automated-message error, revocation, and blockchain finality. For Egypt, amendment or supplementary legislation should expressly address contracts formed by automated agents while preserving Article 147(2) judicial adjustment and Article 160 restitution.

Regulators should also encourage standardized audit records. A court should be able to reconstruct the interface presented to the user, the prose terms, the code version, the signatory credentials, the oracle input, and the execution trace. Without that evidentiary chain, immutability may preserve an event while leaving its legal meaning uncertain.

10. Findings

The analysis produces seven principal findings. First, a smart contract is not necessarily a legal contract. Legal characterization depends on attributable consent, essential terms, lawful purpose, capacity, form, and the role performed by code. Second, Jordanian and Egyptian civil law are sufficiently technologically neutral to recognize many code-based declarations and electronically concluded contracts.

Third, Jordan supplies a clearer statutory basis for automatic-agent attribution through Electronic Transactions Law Article 10. Fourth, the different default rules on formation between absent parties make express definition of blockchain finality essential. Fifth, successful code execution is not conclusive legal performance because good faith, implied obligations, defects, external facts, and mandatory law remain applicable.

Sixth, blockchain immutability does not defeat dissolution or restitution. It changes the implementation of the remedy from deletion of history to a new transfer, equivalent value, tracing, or damages. Seventh, the most reliable legal architecture is hybrid and modular: natural language for judgment-rich obligations and disclosures; audited code for deterministic performance; and an explicit correction and dispute layer for exceptional circumstances.

11. Conclusion

The legal significance of smart contracts lies less in the creation of a new contract type than in the relocation of familiar legal questions. Consent becomes a problem of interface, attribution, and code comprehension. Performance becomes a problem of translation, data quality, and the boundary between deterministic facts and legal standards. Remedies become a problem of implementing restoration without rewriting a distributed historical record.

Jordanian and Egyptian law can address these questions through their existing civil-law architecture, supplemented by electronic-transactions and e-signature legislation. Jordan's 2026 reform and automated-intermediary rule provide an important formation framework. Egypt's explicit judicial hardship power provides an important control against excessively onerous automatic performance. In both systems, however, dedicated clarification would improve legal certainty concerning automated-agent error, blockchain finality, oracle responsibility, consumer disclosure, and practical restitution.

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