

The Code as an Element of Trust in Smart Contract Arbitration Clauses

by **Eduardo Andrés Calderón-Marengo, Tania Rodríguez Palacios, Jaime Elías Torres Buelvas and Piedad Barreto-Granada ***

Abstract: This paper addresses the growing intersection between blockchain technology, specifically through the use of Smart Contracts (SC), and international arbitration as a mechanism for resolving contractual disputes. In the context of a rapidly evolving digital era, this paper proposes the standardization of the code used to trigger arbitration clauses in Smart Contracts, with the aim of fostering legal certainty and trust in these automated processes. This research is based on an in-depth documentary analysis, examining academic sources and online dispute resolution platforms, to identify and synthesize best

practices in the codification of such clauses. Through this exploration, the complexity inherent in translating legal agreements into computer code is revealed, addressing the need for tools that enable users to design and implement arbitration clauses with technical precision and legal validity. This article suggests that, while Smart Contracts offer a promising avenue towards efficiency and transparency in commercial and legal transactions, their full integration into the international arbitration arena requires a standardized framework to ensure legal consistency and accessibility for non-programmers.

Keywords: Contract, Code, Intelligent, Blockchain, Block, International arbitration

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A. Introduction

- 1 SCs are efficient instruments for contracting based on new technologies, and although they facilitate their automatic execution, they are not infallible. In other words, disputes may arise as a result of non-compliance, and in such circumstances which must be provided for in the contract arbitration is the ideal means of resolving such disputes due to its characteristics.
- 2 SCs are a type of electronic contract, which implies a drafting in computational language or codification of content, and in this process the validity of the contract may be put at risk. Although this risk is born of the autonomy of the will of the parties, it is possible that the code will not translate the true will of the parties as it is a language in Boolean logic, generating distrust regarding the activation of legal mechanisms in the event of non-compliance, which are expressed in the arbitration clause or agreement.
- 3 Thus, this research is born from the interest of studying the codification of the clauses that activate the arbitration mechanism, its components, and the codified languages that currently exist, to finally propose a standardization of the codification of the arbitration clause in order to provide elements of confidence to cyber-consumers and legal validity to such clauses in the event of such an eventuality.
- 4 However, this paper starts from the premise that the automation of arbitration through smart contracts is not a neutral or axiologically innocuous solution, but rather a phenomenon that needs to be analyzed

in light of the structural principles of contract law and international commercial arbitration.

open access institutional repositories from the same time period were consulted.

B. Methodology

- 5 This research is of a theoretical, descriptive legal nature, which is why the analytical- synthetic method has been adopted. Therefore, it does not seek to formulate definitive regulatory solutions, but rather to identify doctrinal tensions and structural limitations in the interaction between smart contracts and arbitration.

I. Planning the Search and Selection of Information

- 6 A review of academic literature was conducted in web databases of scientific dissemination, corresponding to the publication of the last seven years (2018-2025) from the following search keywords (Codification of the arbitration clause, Law applicable to Smart Contracts, Lex Cryptographia, Blockchain, arbitration, programming language). Likewise, master's and doctoral papers deposited in

II. Inclusion and Exclusion Criteria

- 7 Subsequently, a preliminary information filtering process was carried out, as follows: Filter 1-The inclusion criteria taken into account were:
 - a) articles in scientific journals,
 - b) authors with a master's degree or doctorate,
 - c) articles in Spanish or English and in institutional repositories, and that they were master's or doctoral works; 136 documents were obtained from this process.
- 8 Filter 2-In this stage, the following exclusion criteria were taken into account:
 - a) that the articles were repeated in several databases,
 - b) that the reading of the abstract did not correspond to the research topic; thus, 106 corresponding; documents were obtained: 106

Table 1. Results of the information search

Source: Created by authors based on information search results.

Author	Concept	Technical aspects	Legal aspects
Szabo	"A smart contract is a computerized transaction protocol that executes the terms of a contract"	Protocol Computerized transaction	Execute terms
Szabo	"A smart contract is a set of promises, specified in digital format, that includes protocols in which the parties fulfill those promises".	Protocol	Set of promises
Sklaroff	"Smart contracts are decentralized agreements created in computer code and stored on a blockchain".	Computer code Stored on a blockchain	Decentralized agreement
Werbach & Cornell	"Smart contracts are digital transactions that execute automatically and use decentralized cryptographic mechanisms for enforcement"	Digital transactions Use cryptographic mechanisms	They run automatically decentralized
Hu; Zhang; Liu & Lin	"Smart contracts are typically defined as event-driven computer programs that are executed and enforced by all participants in a peer-to-peer network in the context of blockchain"	Computer programs P2P network in the context of blockchain	Events executed by participants
Shamala; Balasaraswathi & Gayathri	"Smart contracts are undoubtedly a significant advance in the field of blockchain technology. They are self-executing agreements in which the terms of a transaction between buyer and seller are explicitly encoded in the program. Provided that the conditions specified in the code are met, the smart contract carries out the agreed activities immediately, without the need for intermediaries or third parties".	Blockchain technology Condition coding	Automatic enforcement agreements

C. Smart Contracts (SC)

- 9 Undoubtedly, the Internet has facilitated the creation of new legal businesses¹, it has rapidly blurred territorial borders in the conclusion and execution of contracts, and today we are witnessing a complex network of information transmission and transactions at a global level², in this scenario SCs are born to legal life.
- 10 Contracts are particularly important for the development of societies on a scale that goes beyond the merely commercial, with a legal tradition dating back thousands of years that seeks to provide security regarding the essential elements and aspects related to their formation and execution. The SC scenario makes it necessary to consider an analysis from a dual perspective, both technical and legal, in search of new balances. From a technical perspective, SCs offer many advantages, such as minimizing risks, the involvement of trusted third parties, commercial costs, and transaction costs, among others³; while from a legal perspective, new challenges and possible inefficiencies have arisen, even from basic aspects such as moving away from human language in their construction⁴.
- 11 In this scenario, SCs come to legal life. The following table compiles contributions from some seminal

authors, which demonstrate the maturation of the elements and characteristics of the concept:

Table 2. Academic contributions to the concept of SCs

Platform	Description
Kleros	Kleros is a decentralized platform that uses blockchain technology to provide a transparent and fair arbitration system. It uses a jury selection mechanism based on game theory, where jurors are randomly selected to evaluate evidence and make decisions in disputes related to smart contracts and other Digital agreements (Aouidef et al., 2021)
Aragon Court	Aragon Court is a platform designed to resolve disputes with in the ecosystem of Aragon's Decentralized Autonomous Organizations (DAOs). It provides a dispute resolution mechanism that allows DAO users to submit their disputes to a virtual panel of judges, who evaluate the evidence presented and make a collective decision based on pre-established community rules (Aouidef et al., 2021).
Jur	Jur is an innovative platform that offers arbitration services for commercial and legal contracts, leveraging blockchain technology to ensure fairness and transparency in the dispute resolution process. It focuses on providing an efficient and accessible solution for commercial dispute resolution, facilitating an environment of trust for all parties involved (Schmitz and Rule, 2019).
OpenLaw	OpenLaw is a powerful tool that facilitates the creation, execution and Management of legally supported smart contracts. It allows users to easily integrate arbitration clauses into their digital contracts, providing a framework for automated, blockchain-based dispute resolution. Open Law stands out for its flexibility and for offering a user-friendly interface for Drafting digital legal contracts (Schmitz and Rule, 2019).
Mattereum	Mattereum is a platform that seeks to bridge the gap between physical and digital assets through smart contracts, providing a robust legal infrastructure for trading these assets. It includes an arbitration service to handle disputes, ensuring that agreements are executed fairly and efficiently. Mattereum is pioneering the use of Blockchain technology to create an automated and Decentralized legal system (The Mattereum Team, 2018).

Source: Created by authors based on the sources cited.

- 1 Tatiana D Zabala, 'La ética en la inteligencia artificial desde la perspectiva del derecho' (2021) 16(2) *Via Inveniendi et Iudicandi* 1.
- 2 Eduardo Perafán, Sebastián Polo, Marco Sánchez and Catalina Miranda, 'Estado y soberanía en el ciberespacio' (2021) 16(1) *Via Inveniendi et Iudicandi* 1.
- 3 Nick Szabo, 'Smart Contracts' (1994) <http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html> accessed 13 September 2026.
- 4 Jeremy M Sklaroff, 'Smart Contracts and the Cost of Inflexibility' (2017) 166 *University of Pennsylvania Law Review* 263.

- 12 Amid this dual technical and legal relationship of SCs, in order to avoid risks and inefficiencies, Szabo, as a pioneer in conceptualizing this new contracting environment, proposed four basic objectives for the design of SCs in 1996: observability, verifiability, privity, and enforceability. Their meaning, in this same order, is related to the following aspects: a) ease of access and ability of the parties to closely monitor compliance with the contract, b) monitoring or auditing functions regarding compliance, c) contractual privacy that must be maintained regarding the content and control of compliance with a contract exclusively by the parties; and finally, d) when “self-enforcement” protocols exist, it is important for the parties to know the phases in which these circumstances occur and to be able to verify them, as external elements such as the proper functioning of the technological infrastructure can have a particular impact on self-enforceable phases.
 - 13 More recently, authors such as Hu, Zhang, Liu & Lin (2021) propose security and correctness as the pillars of SCs; security as the “ability to resist unauthorized state changes, including fund transfers, state manipulation, and accidental self-destruction” and correctness as the “ability to correctly perform the expected function,” while privacy and efficiency are properties provided by cryptography and hardware equipment.
 - 14 From the perspective of law, some authors consider that SCs are computer programs that translate agreement previously agreed upon by the parties, i.e. they are software, given that they are expressed in a computer code containing an agreement for automatic execution, a new computerized form of executing all or some of the obligations contained in a previously agreed contract⁵.
 - 15 In other words, the software is the computer support of a contract that according to Centeno⁶ is agreed to in traditional language and then encoded and subsequently included in the blockchain or *Blockchain* technology, “in this way, the contract would have two languages. One composed of the codes that are going to be managed in the *Blockchain*, and another that is going to be of legal content”⁷.
 - 16 Thus, meaning in the context of *Blockchain*, computer code that is stored in a *Blockchain* and can be accessed by one or more parties⁸; and with respect to the SC part of legal content, it contains the information on how the arbitration mechanisms are activated in the face of any conflict that may arise between the parties⁹.
 - 17 Some countries have begun to recognize in their legislations the conceptualization of SC, i.e., through the Decree-Law of December 14, 2018, Article 8 Italy proposes as characteristics, that SCs are “computer technologies and protocols that use a shared, distributed, replicable, simultaneously accessible and architecturally decentralized record on a cryptographic basis”¹⁰, accessible by participants, but not alterable or modifiable. The Decree-Law further specifies “the storage of an electronic document through the use of technologies based on distributed records produces the legal effects of electronic time stamping referred to in Article 41 of Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014”¹¹.
 - 18 Camacho López¹² explains that in the United States of America, the first State to legislate on SCs was Arizona in 2017, by introducing Article 5 which defines Blockchain technology and smart contract Title 44 of its statutes, dedicated to exchanges and
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- 5 Kristel G Loayza, ‘Legal Analysis of Smart Contracts Based on Blockchain Technology in Business-to-Consumer (B2C) E-Commerce’ (thesis, Universidad Católica San Pablo 2019). Juan José Almonacid Sierra and Yeison Coronel Ávila, ‘Aplicabilidad de la inteligencia artificial y la tecnología blockchain en el derecho contractual privado’ (2020) 38 *Revista de Derecho Privado* 119, 119–42.
 - 6 Rafael J Centeno, ‘Introducción al blockchain, contratos inteligentes y la aplicabilidad del arbitraje a esta tecnología’ (2020) 1 *Anuario Venezolano de Arbitraje Nacional e Internacional* 483 <https://avarbitraje.com/wp-content/uploads/2021/03/ANAVI-No1-A22-pp-483-500.pdf> accessed 13 September 2026.
 - 7 *ibid.*
 - 8 EU Blockchain Observatory and Forum, ‘Legal and Regulatory Framework of Blockchains and Smart Contracts’ (Thematic Report, 2019) https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf accessed 26 August 2024.
 - 9 *ibid.* p. 6.
 - 10 Decreto-legge 14 dicembre 2018, n 135, ‘Disposizioni urgenti in materia di sostegno e semplificazione per le imprese e per la pubblica amministrazione’ [2018] GU Serie Generale No 290.
 - 11 *ibid.*
 - 12 María Elisa Camacho López, ‘Estudio de los contratos legales inteligentes y de sus normas aplicables en el ámbito del derecho del consumo en Colombia’ (master’s thesis, Universidad Externado de Colombia 2021) 35 <https://doi.org/10.57998/bdigital.handle.001.3984> accessed 13 September 2026.

commerce, on electronic transactions. Indeed, Article 5 item e indicates that:

Smart contract means an event-driven, stateful program running on a distributed, decentralized, shared and replicated ledger that can assume custody and provide instructions for the transfer of assets in that ledger.¹³

- 19 Thus, SCs are characterized as computer programs, based on a system of logical rules designed to execute the services of a contract, which depend on a sequence of programmed instructions, generating rights and obligations, as well as legal effects. Finally, the obligations are self-executing once they are activated and compliance with the established conditions is verified¹⁴.
- 20 On the other hand, *Blockchain* technology according to Centeno¹⁵ is an autonomous system, based on the operation of nodes working under a computerized protocol, i.e., it does not need a centralized system. Therefore, the trust, validity, and security of transactions does not come from any intermediary but from the network, thus representing a more transparent system, in which all nodes can participate. However, this system does so without altering the stored information because it is protected by cryptographic algorithms, and given its distributed nature, it makes a possible cyber crime more difficult, since all the copies stored in the network must be attacked at the same time¹⁶.
- 21 In practice, SC as automatic mechanisms for the execution of computer instructions, in this case contract execution, became a reality from the development of *Blockchain* -- specifically since 2014-- with the creation of *Ethereum* (Domínguez, 2022).
- 22 An SC takes the form of a computer code (through a programming language, e.g. *Solidity*) in a distributed ledger technology, which can be a *Blockchain*, and is executed when it receives electronic data inputs. It is an agreement between two parties whose purpose is to execute previously agreed upon obligations, replacing physical paper with a predetermined computer code with the will of the parties.
- 23 The use of SC involves a high-level language (compiled binary code), and the use of special software, which transforms a language such as *Solidity* into machine instructions expressed in byte code¹⁷, operates according to the algorithm written in it, without human intervention, thus eliminating intermediaries and maximizing the efficiency of business processes.
- 24 It is worth mentioning, that in the period between 2018 and 2023, the use of SC has experienced exponential growth, mainly in the finance, insurance, real-estate, and supply chain sectors. However, tests have also begun to use smart contracts and blockchain in judicial case management, proposing a private-to-public blockchain approach in Pakistan¹⁸. According to research by Asmakov¹⁹, the number of SCs deployed on the *Ethereum* network grew by 293 percent in 2022 and almost 300 percent in 2023, highlighting their growing application in areas such as decentralized finance (DeFi) and non-fungible tokens (NFTs).
- 25 While the positive results are undeniable in terms of trust provided by the use of *Ethereum* blockchain technology because of the highly specialized programming languages it uses such as *Solidity*, it is important to note that despite its technological efficiency it is difficult for ordinary users to design a usable SC based on their own demands²⁰. A consequence of this difficulty that ordinary users have is revealed by Hoffman's study, who points out that how before 2021, *Ethereum* reveal confidential information from blockchains, which should not be exposed to the public and could potentially include identities, contract data as well as legal data²¹.
- 26 This is how the intervention of the State is timely, by improvements in legislation and regulation around *blockchain* and SC technology providing a clearer legal framework that supports and drives its use.
- 27 Some scholars have proposed the use of Ricardian contracts or hybrid contracts as a mechanism to reinforce the accreditation of free consent and as a full expression of will in smart contracts. In this configuration, a text in natural language describing the terms and conditions to be automated is incorporated into the executable logic of the smart contract, which increases contractual transparency and makes it easier for a non-technical party to

13 *ibid.*

14 Tahir Alyas and others, 'Multi-Blockchain Architecture for Judicial Case Management Using Smart Contracts' (2025) 15 *Scientific Reports* 8471 <https://doi.org/10.1038/s41598-025-92842-8> accessed 13 September 2026.

15 *ibid.* p. 6.

17 Agnieszka Kubiak-Cyrul, 'Challenges of Smart Contracts in Contract Law: Do Algorithmic Tools Undermine Human Autonomy?' in L Miraut Martín and M Zahucki (eds), *Artificial Intelligence and Human Rights* (Dykinson 2021) 327.

18 *Ibid.* p. 8.

19 Andrew Asmakov, 'Smart Contracts Deployment on *Ethereum* Grows 293% in 2022' (Decrypt, 17 January 2023) <https://decrypt.co/es/119381/despliegue-de-smart-contracts-en-ethereum-crecio-293-en-2022> accessed 13 September 2026.

20 Dianhui Mao and others, 'Visual and User-Defined Smart Contract Designing System Based on Automatic Coding' (2019) 7 *IEEE Access* 73131 <<https://doi.org/10.1109/ACCESS.2019.2920776>> accessed 13 September 2026.

21 Hofmann and others (n 17) 354.

understand the scope of the obligation before expressing their acceptance. Consequently, this scheme contributes to the formation of legally valid consent, insofar as it reduces information asymmetries and more precisely defines the content of the agreement.

D. Arbitration Clauses in SC

- 28 Arbitration as a mechanism for resolving private disputes (civil or commercial) has proven its effectiveness compared to state justice, especially when it comes to conflicts arising in the international arena, as a digitized and decentralized dispute resolution process becomes necessary²².
- 29 Since the contract is self-executing, it is generally not necessary to know the identity of the counterparty, since compliance and execution are guaranteed by the automation of the code. However, it is necessary to determine how the parties, especially when they do not know each other, will resolve differences that arise after the automatic execution of a SC²³ due to disputes of various kinds, for example, programming errors, payment defaults, among others.

I. Aspects of the validity of international arbitration clauses

- 30 The validity of the arbitration clause expressed in codified language can be based on the content of international instruments and national legislation on arbitration and electronic commerce, such as the Convention on the Recognition and Enforcement

of Foreign Arbitral Awards of the United Nations Commission on International Trade Law²⁴, Article 2:

Each Contracting States shall recognize an agreement in writing under which the parties undertake to submit to arbitration all or any differences which have arisen or which may arise between them in respect of a defined legal relationship, whether contractual or not, concerning a subject matter capable of settlement by arbitration.

- 31 On the other hand, the Model Law on International Commercial Arbitration of the United Nations Commission on International Trade Law²⁵, as amended in 2006, establishes in Article 7:
- 32 (1) "Arbitration agreement" is an agreement by the parties to submit to arbitration all or certain disputes which have arisen or which may arise between them in respect of a defined legal relationship, whether contractual or not. An arbitration agreement may be in the form of an arbitration clause in a contract or in the form of a separate agreement. (2) The arbitration agreement shall be in writing. (3) An arbitration agreement is in writing if its content is recorded in any form, whether or not the arbitration agreement or contract has been concluded orally, by conduct, or by other means. (4) The requirement that an arbitration agreement be in writing is met by an electronic communication if the information contained therein is accessible so as to be able for subsequent reference; "electronic communication" means any communication that the parties make by means of data messages; "data message (?)" means information generated, sent, received or stored by electronic, magnetic, optical or similar means, including, but not limited to, electronic data interchange (EDI), electronic mail, telegram, telex or telecopy. (5) Furthermore, an arbitration agreement is in writing if it is contained in an exchange of statement of claim and defence in which the existence of an agreement is alleged by one party and not denied by the other. (6) The reference in a contract to any document containing an arbitration clause constitutes an arbitration agreement in writing, provided that the reference is such as to make that clause part of the contract. In fact, doctrine and jurisprudence have understood the requirement of writing an arbitration clause to be fulfilled through technological means, and this is also consistent with the electronic commerce

22 Michael Buchwald, 'Smart Contract Dispute Resolution: The Inescapable Flaws of Blockchain-Based Arbitration' (2020) 168 *University of Pennsylvania Law Review* 1369 https://scholarship.law.upenn.edu/penn_law_review/vol168/iss5/3 accessed 13 September 2026.

23 James Metzger, 'The Current Landscape of Blockchain-Based, Crowdsourced Arbitration' (2019) 19 *Macquarie Law Journal* 81 https://www.mq.edu.au/__data/assets/pdf_file/0010/866287/Blockchain-Based-Crowdsourced-Arbitration.pdf accessed 13 September 2026.

24 Convention on the Recognition and Enforcement of Foreign Arbitral Awards (adopted 10 June 1958, entered into force 7 June 1959) 330 UNTS 3 (New York Convention).

25 United Nations Commission on International Trade Law, *UNCITRAL Model Law on International Commercial Arbitration* (1985) <https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/19-09955_e_ebook.pdf>

legislation of those countries inspired by the Model Law on Electronic Commerce of the United Nations Commission on International Trade Law (UNCITRAL, 1996), which in its Article 5 recognizes the principle of functional equivalence, granting the same validity of a written document to data messages.

II. Decentralization of applicable law and the seat of the arbitral tribunal

33 In international contracting, operators often opt for arbitration because of its efficiency, neutrality, greater control over the proceedings, specialization of the arbitrators, and enforceability of the award. However, these advantages are weakened when the arbitration agreement is poorly drafted, as this opens the door to protracted and costly disputes over its existence, validity, effects, interpretation, or enforcement, often associated with an inadequate determination of the applicable law. Although it is often treated as an ancillary provision during negotiations, the governing law of the arbitration agreement is structural: it governs essential aspects such as its existence, validity, effectiveness, scope, interpretation, waiver, termination, and enforcement, and may condition both the commencement of the proceedings and the subsequent validity of the award.

34 The traditional solution tends to subject the clause to the law of the main contract, but in international commercial arbitration, several legal systems with applicability converge, maintaining uncertainty: the *lex arbitri*, which does not necessarily coincide with the law of the agreement and whose divergence can generate friction in matters of doubtful classification; the law of arbitrability, usually linked to the seat, although it is sometimes connected to the substantive law of the dispute; the law applicable to the merits, where controversial references such as *lex mercatoria* and *ex aequo et bono* decisions appear; and, finally, the law governing the validity of the arbitration agreement itself, the determination of which often poses the greatest difficulties because there is no single legal system that uniformly regulates all its aspects²⁶.

35 In this vein, determining the seat of arbitration takes on special relevance, and in blockchain-based environments, the decentralized architecture itself makes it substantially difficult to identify the place of arbitration and, correlatively, the applicable law.

The transnational dispersion of the nodes that make up the registry makes it difficult to easily establish an unambiguous regulatory connection point and, consequently, to define the governing law of the arbitration agreement. If this precision is not incorporated into the design of the legal transaction, the risks of controversy increase and the costs of resolution rise, as the *ex post* determination of the competent legal framework is often complex and contentious²⁷.

36 Although arbitration is based on freedom of contract, its practical effectiveness presupposes the intervention of judicial bodies of a given legal system, both for support and control functions. For this reason, the designation of the seat is decisive, especially in international arbitration, as it identifies the competent state courts in the absence of supranational bodies with general powers. The seat is not equivalent to the physical place where hearings are held, evidence is taken, or deliberations are conducted, nor does it necessarily coincide, in administered arbitrations, with the domicile of the administering institution; it operates as a strictly legal point of connection. To that extent, the seat links the proceedings to the legislation and courts of a State (*lex loci arbitri*), so that its legal system supports the arbitration by defining the jurisdiction for support and control, determining the applicability of the arbitration rules (*lex arbitri*), and attributing “nationality” to the award.

37 In light of the above considerations, the decentralization of arbitration supported by SC may lead to the parties omitting to determine the seat and applicable law from the design or codification phase of the arbitration agreement. This risk is intensified in adhesion contract schemes, which are common in web environments, where the predisposing party sets the conditions and the adhering party has no real room for negotiation. The indeterminacy of these elements has adverse legal consequences, prevents the competent court from being identified with certainty for support and control functions and, in particular, for the recognition and enforcement of the award; it introduces uncertainty about the legal regime governing the arbitration and the law under which the dispute will be resolved; and it makes it difficult to specify the scope of arbitrability, with a consequent increase in the risk of challenge and possible annulment of the award.

38 In this area, since arbitration is a discretionary mechanism based on freedom of contract, it is advisable that the Ricardian contract include, in its

26 José Carlos Fernández Rozas, ‘Ley aplicable al convenio arbitral en ausencia de elección expresa de las partes’ (2024) 16(2) Cuadernos de Derecho Transnacional 646 doi:10.20318/cdt.2024.8936.

27 Cayetana Santaolalla Montoya, ‘Los criptotribunales: un arbitraje en la cadena de bloques, con smart contracts y según la teoría de juegos’ (2025) 17(2) Cuadernos de Derecho Transnacional 780–801 doi:10.20318/cdt.2025.9899.

natural language wording, an arbitration clause, a clause on the law applicable to the substance of the dispute, and the determination of the seat, in order to enable its subsequent codification and enforcement on the blockchain²⁸. When this provision does not exist, it is necessary to resort to the rules of the conflict method of private international law. In such a case, the arbitral tribunal may define the law applicable to the merits by identifying the most relevant connecting factors of the legal transaction, or consider approaches such as the so-called cryptographic lex; However, in order to ensure predictability and reduce uncertainty, the preferred criterion is to apply the law of the State with the closest links to the contractual relationship.

39 This approach determines the law applicable to arbitration based on the legal system that has the “closest links” to the agreement. Unlike models that privilege a single connecting factor, this technique allows for a more nuanced weighing of factors and has been used frequently in recent decades, supported by formulations such as those in the Restatement (Second) of Conflict of Laws (1971) and Article 4 of the 1980 Rome Convention.

40 Even though the Rome I Regulation partially departed from this logic. In this context, the court must recognize the choice of law made by the parties, even when it is implicit; if that choice is not identified, it is necessary to determine the legal system with which the contract has the most real and close connection. The notion of “closest connections” is not limited to indicators of territorial proximity—such as the residence of the parties, the place of conclusion, the place of performance, the location of assets, or the market affected—because none of these has autonomous value or universal scope. The weight of each criterion varies according to the type of contract and its structure, depending on the intensity of the legal and economic connection in the specific case. Consequently, the decisive factor is not the geographical circumstance itself, but the degree to which the connecting factor satisfies the requirements of economic efficiency, certainty of transactions, and predictability, taking into account the economic purpose and legal function of the contract²⁹.

41 Once a solution has been identified for cases in which the SC does not provide for the applicable law, the analysis is also extended to the possible challenge of

the award on grounds of nullity. In effect, Article 34 of the UNCITRAL Model Law concentrates judicial review of the award in a single channel, the petition for nullity, which excludes other means of challenge before state courts. This action is only admissible on specific grounds that the requesting party must prove, including the incapacity of a party or the invalidity of the arbitration agreement under the law chosen by the parties or, in the absence of a choice, under the law of the State of the seat.

42 Failure to notify or affect the right of defence; exceeding jurisdiction by ruling on matters not submitted to arbitration; and failure to comply with the agreement on the composition of the tribunal or the procedure, unless such agreement contradicts mandatory rules. In turn, the court may declare the award null and void when the matter is not arbitrable under the law of the State or when the award is contrary to public policy.

43 In technical and legal terms, determining the applicable law not only fulfills a substantive function with respect to the contract, but also allows for the reconstruction of the procedural framework surrounding arbitration and, in particular, judicial review of the award. When the governing legal system is identified—either by choice of the parties or by conflict criteria, such as the closest connection—a regulatory framework is obtained that facilitates: (i) determining the legally relevant seat or, at least, the State with authority to project effects on the arbitration; and (ii) establishing the statute applicable to the action for annulment, insofar as the review of the award is generally linked to the legal system of the place that serves as the institutional support for the arbitration.

44 In this regard, the applicable law serves as a starting point for identifying the competent court to hear the nullity claim, for two reasons. First, because judicial review of the award is normally structured in accordance with the *lex arbitri* of the State acting as the seat, that legal system defines which state court exercises the functions of support and control, the form of the challenge, and the requirements for admissibility. Second, because even when the seat is not expressly determined—a plausible assumption in decentralized architectures—the identification of the legal system most closely linked to the legal relationship allows the attribution of jurisdiction to be directed toward the courts of that State, as a final solution that reduces jurisdictional uncertainty and avoids the practical impossibility of challenging or defending the award.

45 That same law also defines the grounds for nullity and their prerequisites. In systems inspired by the UNCITRAL Model Law, for example, judicial review is channeled through an action for annulment with limited grounds, which include defects in the

28 Eduardo Calderon Marenco, ‘Los elementos esenciales en los smart contract’ in E Álvarez Miranda (ed), *Retos y paradigmas del derecho y la sociedad: Instituciones modernas, tecnología y justicia* (Fondo Editorial de la Universidad de San Martín de Porres 2025) <www.publicacionesusmp.com/2025/04/retos-y-paradigmas-del-derecho-y-la.html>

29 José Carlos Fernández Rozas, ‘Ley aplicable al convenio arbitral en ausencia de elección expresa de las partes’ (2024) 16(2) *Cuadernos de Derecho Transnacional* 646.

arbitration agreement (incapacity or invalidity under the chosen law or, failing that, the law of the State), violations of the right of defence, excess of jurisdiction, irregularities in the composition of the tribunal or in the proceedings, as well as substantive limits related to arbitrability and public policy. Thus, the determination of the applicable law makes it possible to anticipate not only which judge will hear the application for annulment, but also what standard of review will be used, what substantive and procedural limits are relevant, and under what parameters the validity of the award will be assessed.

- 46 Consequently, in arbitration supported by SC, establishing the applicable law (ideally together with the seat) helps to ensure the enforceability of the award and the predictability of the judicial review system. If that determination is lacking, the use of a conflict-of-laws criterion such as the closest connection not only guides the governing law of the contract but also provides an argumentative basis for anchoring judicial jurisdiction and the nullity regime in an identifiable legal system, which mitigates the risk of defencelessness, forum shopping, and subsequent challenges due to regulatory uncertainty.
- 47 In light of the above, decentralization and the transnational projection of blockchain technology strain the classic criteria for determining jurisdiction and applicable law, requiring regulatory frameworks capable of providing effective responses to disputes arising in digital environments. Similarly, the analysis of SCs requires the incorporation of an ethical and philosophical dimension associated with the transition toward the automation of contractual relationships. In particular, the debate on the desirable scope and feasibility of formalizing legal language through its codification raises a structural question about the relationship between technology, law, and society. The possibility of translating legal categories and reasoning into computer code ultimately raises substantive questions about justice, equity, and autonomy in the digital age³⁰. Therefore, in the subsequent analyses of this research, structural proposals will be made to guarantee the legal security of users in decentralized environments.
- 48 Other authors, such as Rab³¹, argue that it is advisable to qualify the scope of this solution somewhat. This

is because, although the Ricardian contract can reduce information asymmetries in the consent formation phase, it does not eliminate the problems that arise *ex post*, when the execution of the code produces effects that diverge from the text in natural language. In such cases, the critical issue is not so much the clarity of the initial consent as the determination of which of the two languages—legal or computational—should prevail, especially in automated and transnational environments.

- 49 Platforms that provide the dispute resolution service
- 50 From the increasing interaction of SC users, platforms have been developed that provide the service of dispute resolution, such as arbitration, within the blockchain environment. The following are some of them.

30 Eduardo Andrés Calderón Marengo, Jimmy Enrique Garzón Solano, Romina M Sánchez Silveyra, Gabriel Ravelo-Franco and Guillermo O Sal, 'Retos jurídicos en la codificación de la cláusula de responsabilidad civil en contratos inteligentes' (2025) 14 *Revista Chilena de Derecho y Tecnología* e74870 <https://doi.org/10.5354/0719-2584.2025.74870>.

31 Ajar Rab, 'Smart Contracts and Blockchain: The Panacea to the Unequal Bargaining Power of Consumers?' (2021) 8(1) *International Journal on Consumer Law and Practice* <https://>

repository.nls.ac.in/ijclp/vol8/iss1/3 accessed 19 July 2026.

Table 3. Platforms that provide dispute resolution service

Platform	Description
Kleros	Kleros is a decentralized platform that uses blockchain technology to provide a transparent and fair arbitration system. It uses a jury selection mechanism based on game theory, where jurors are randomly selected to evaluate evidence and make decisions in disputes related to smart contracts and other Digital agreements (Aouidef et al., 2021)
Aragon Court	Aragon Court is a platform designed to resolve disputes with in the ecosystem of Aragon's Decentralized Autonomous Organizations (DAOs). It provides a dispute resolution mechanism that allows DAO users to submit their disputes to a virtual panel of judges, who evaluate the evidence resented and make a collective decision based on pre-established community rules (Aouidef et al., 2021).
Jur	Jur is an innovative platform that offers arbitration services for commercial and legal contracts, leveraging blockcha in technology to ensure fairness and transparency in the dispute resolution process. It focuses on providing an efficient and accessible solution for commercial dispute resolution, facilitating an environment of trust for all parties involved (Schmitz and Rule, 2019).
OpenLaw	OpenLaw is a powerful tool that facilitates the creation, execution and Management of legally supported smart contracts. It allows users to easily integrate arbitration clauses into their digital contracts, providing a framework for automated, blockchain-based dispute resolution. Open Law stands out for its flexibility and for offering a user-friendly interface for Drafting digital legal contracts (Schmitz and Rule, 2019).
Mattereum	Mattereum is a platform that seeks to bridge the gap between physical and digital assets through smart contracts, providing a robust legal infrastructure for trading these assets. It includes an arbitration service to handle disputes, ensuring that agreements are executed fairly and efficiently. Mattereum is pioneering the use of Blockchain technology to create an automated and Decentralized legal system (The Mattereum Team, 2018).

Source: Created by authors from Aouidef et al. 2021; Schmitz and Rule, 2019; The Mattereum Team

2018.³²³³³⁴

51 The use of the platforms works perfectly for consumers conducting transactions from long distances, but within commercial business with small amounts. However, not everything is perfect since, after analyzing the above, local laws present difficulties in terms of constitutional law, as well as altering the principles of due process, since elements of subjective nature are not present and the absence of such elements may result in unfair solutions.

E. How Codes of Arbitration Clauses Can Build Trust in Arbitration Clauses

52 Although arbitration as an alternative dispute resolution mechanism in SCs is gaining popularity, there are still problems related to the correct codification of contractual clauses, including the arbitration clause. It is also true that when problems arise in the execution (bugs in the code, for example), a complaint system has to be activated, which can be difficult due to the fact that blockchains involve people from different jurisdictions.

53 In this regard, some States have legislation on blockchains such as SCs, with minimum parameters for developing the arbitration clause, with the intention of achieving consistency with national legal systems and the rights of the contracting parties, especially consumers³⁵.

54 It is important to remember that although arbitration based on blockchain technology is often presented as an ideal mechanism for strengthening trust between parties operating in transnational environments, such trust cannot be derived exclusively from the standardization of the code

32 Yann Aouidef, Federico Ast and Bruno Deffains, 'Decentralized Justice: A Comparative Analysis of Blockchain Online Dispute Resolution Projects' (2021) 4 Frontiers in Blockchain 564551 <https://doi.org/10.3389/fbloc.2021.564551>.

33 Amy J Schmitz and Colin Rule, 'Online Dispute Resolution for Smart Contracts' (2019) Journal of Dispute Resolution 103.

34 The Mattereum Team, Mattereum Protocol: Turning Code into Law (2018) https://mattereum.com/wp-content/uploads/2020/02/mattereum-summary_white_paper.pdf accessed 19 July 2026.

35 A Legerén, 'Retos jurídicos que plantea la tecnología de la cadena de bloques' (2019) 6(1) Revista de Derecho Civil 177 <https://dialnet.unirioja.es/servlet/articulo?codigo=6876649> accessed 19 July 2026.

that activates the arbitration clause. In fact, the trust generated by the code is primarily technical, based on the predictability of automatic execution and the resistance to manipulation offered by the cryptographic infrastructure. However, as Buchwald³⁶ points out, from a legal-arbitration perspective, that trust does not automatically acquire the character of substantive law, understood as the reasonable expectation that the procedure will respect essential guarantees such as due process, equality of the parties, and the possibility of ex post control of the award.

- 55 Most of the current studies from the legal field on SC focus on the security of codification and the theorization of these instruments based on national legislations. However, there are no studies from computer science and law that analyze the lack of user-friendly tools for users to design specialized contract codification templates, and in particular the arbitration clause, in order to provide legal certainty in case of disputes.
 - 56 As a first step it should be taken into account that SCs dispense with state intervention and its regulation due to the delocalized nature that characterizes it³⁷, therefore it is desirable that “the online dispute resolution mechanism that is developed is aided by this same technology to provide simplicity to the process, but at the same time security both for the parties and for the shared data smart contracts”³⁸, thus providing the same dispute resolution mechanisms with flexibility and adaptability to emerging controversies³⁹. It is worth mentioning that arbitration has moved too the virtual scenarios and acquired new forms, such is the case of *Online Dispute Resolution*⁴⁰, which is now intended to be carried out through codified language, characteristic of SCs⁴¹.
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- 36 Michael Buchwald, ‘Smart Contract Dispute Resolution: The Inescapable Flaws of Blockchain-Based Arbitration’ (2020) 168(5) University of Pennsylvania Law Review 1369 https://scholarship.law.upenn.edu/penn_law_review/vol168/iss5/3.
 - 37 María Yépez, I María Vela and Bernarda Haro, ‘Smart contracts y arbitraje: hacia un modelo de justicia deslocalizado’ (2020) 7(1) USFQ Law Review 1 <https://doi.org/10.18272/ulr.v7i1.1698>.
 - 38 G Hierro Viéitez, ‘Introducción al Blockchain, los contratos inteligentes y su relación con el arbitraje’ (2021) 79 Revista de Derecho 299, 302 <https://dialnet.unirioja.es/servlet/articulo?codigo=8328966> accessed 19 July 2026.
 - 39 Sonia Sánchez and Faisury Rodríguez, ‘Eficiencia del arbitraje en la garantía del derecho de acceso a la administración de justicia’ (2021) 16(2) Via Inveniendi et Iudicandi 277 <https://doi.org/10.15332/19090528/6251>.
 - 40 EA Calderón Marengo and J Torres Buelvas, ‘La autonomía de la voluntad y los contratos wraps’ in C Reyes Díaz, R Martínez Regino and HA Ramírez Medina (eds), *Derechos Humanos y Políticas Públicas ante los nuevos retos sociales en México* (Universidad Nacional Autónoma de México 2021) http://derecho.posgrado.unam.mx/site_cpd/public/publicis_cpd/derechoshumanos.pdf accessed 19 July 2026.
 - 41 Ignacio Tasende, ‘Blockchain y arbitraje: un nuevo enfoque en la resolución de disputas. Especial énfasis en smart contracts y criptodivisas’ (2020) 22 Revista de Derecho 138 <https://www.scielo.edu.uy/pdf/rd/n22/2393-6193-rd-22-138.pdf> accessed 19 July 2026.
 - 42 Kristel G Loayza, *Legal Analysis of Smart Contracts Based on Blockchain Technology in Business-to-Consumer (B2C) E-commerce* (thesis, Universidad Católica San Pablo 2019).
 - 43 Pietro Ortolani, ‘The Impact of Blockchain Technologies and Smart Contracts on Dispute Resolution: Arbitration and Court Litigation at the Crossroads’ (2019) 24(2) Uniform Law Review 430 <https://doi.org/10.1093/ulr/unz017>.
 - 44 C Correa Martínez, ‘La autonomía de la voluntad y el análisis económico del derecho desde la perspectiva de Richard Posner’ in JM Álvarez Zárate and K Fach Gómez (eds), *Apuntes prácticos sobre la autonomía de la voluntad como punto de conexión en el derecho económico internacional* (Universidad Externado de Colombia and Universidad de Zaragoza 2021).

transnational level seems particularly desirable, in order to ensure efficiency while avoiding excessive restrictions on technological developments. A significant first step could be the development of soft law guidelines that identify a list of practices that codifiers should avoid⁴⁵.

- 61 Elements for the design of the arbitration clause or agreement
- 62 It should be recalled that the objective of the comparison between Smart Contracts and distributed systems is to implement a scalable and economical solution with high performance in the use of software resources, using cluster systems and development languages for the development of *per-to-per* systems as a means of process integration. The sharing of resources that a computer system has allows the use of such resources in a reciprocal way and allows access to them at any time, i.e., the physical and logical infrastructure of a computer currently allows infrastructures that must be oversized for normal operation in the sharing of technological resources. However, for this to occur, the normal operation of the technology must be guaranteed and, in the event of over-saturation, the secondary surplus must be available due to the oversizing of said technology.
- 63 This oversizing leads to the scenario of computational architecture, which takes an evolving context associated with processors and *multi-core-architectures*. In addition to this, the implementation of networks articulated with the architecture allows the distributed enablement of processes and the increase in the processing power of packet in formation in several computers and subsequently returning it to a single packet without the need for the accompaniment or control of the internal clock of the machine. This will allow *Smart Contracts* to be accessed in real time without altering the structure of the contract depending on the user who is executing it. Which allows the arbitration clause to generate results in real time for each of the processes required regarding the use of smart contracts and the completion of these by the users who access it⁴⁶.
- 64 In this sense, this concept is also applied to high-speed networks, they are the most viable alternative solution for sharing resources, since they are presented as an economical and scalable solution, allowing collaboration and optimization of these networks and thus the contracts that are processed will deliver a much more truthful result in an reduced time. This can materialize as long

as at both ends there are devices that allow the interaction of users on smart contracts, directly guaranteeing the sharing of there source and the diligence of the contract execution to obtain the final result expected from *Smart Contracts*. This will be achieved by applying standards that guarantee the interoperability of the different participants or called users that require a definitive and systematic solution generated from the *Smart Contract*.

- 65 The existence of recognized standards from the development of *Ethereum* as in the design of *Smart Contracts*, and the integration that they must have guarantee the development of particular *software* to achieve interoperability of the different possible solutions of these softwares and their scalability.
- 66 It is necessary to ensure that there is a balance between what the smart contract offers to the world and what it can offer legally, from the answers and decisions that can be programmed in the smart contract from the proposed arbitration clause. The design of the *Smart Contract* proposes the realization of diagrams on the arbitration clause that allow the interaction between the programmers and the users that will work on the *software* in which the arbitration clause will be designed, achieved through the UML language (unified modelling language), which allows the development of software from objects.
- 67 The UML modelling language is one of the most widely used standards to documentary system accurately. In this context, the user interface can be designed with the requirements of the Smart Contract applied to the arbitration clause, creating profiles that are a mechanism to understand the syntax and semantics in the design of the software, and the language used by the contract or to express the specific concepts to be implemented in the smart contract. Based on graphs, a system is modelled that allows the modelling of SC sand understanding the work of the arbitration clause in between the users and the arbitrators⁴⁷.
- 68 Now, the development of UML diagrams can generate an *ad-hoc* application that in the context of the SC will allow the correspondence with the concepts that the arbitration clause will have, managing to respect the standard UML model applied to the concepts worked by the MOF (Meta-Object Facility). After the design has been carried out on the unified modelling language or UML, the people directly involved in the design of the *Smart Contract* (programmers and users) will verify the elaboration and consistency of the *items* placed in the arbitration clause and the final result that the contract will generate. Thus, the multidisciplinary work performed by developers and

45 *ibid.* p. 20.

46 Harold Castro, 'Grid Computing: Promesas de los Sistemas Distribuidos' (2006) *Sistemas* 98, 47–55 https://acis.org.co/portal/Revista/98/4_Uno.pdf.

47 Lidia Fuentes-Fernández and Antonio Vallecillo-Moreno, 'An Introduction to UML Profiles' (2004) 5(2) *UPGRADE: The European Journal for the Informatics Professional* 6–13.

programmers, are articulated with the legal review that starts from a Ricardian contract, or only the will of the parties, which will integrate all the elements participating in the execution of the arbitration clause applied to the smart contract. With the component of semantic analysis, the results and the generation of conclusions will be much safer to understand and from the content of the agreement that rules the contract

- 69 Thus, the result that can generate a smart contract is articulated with *peer-to-peer* systems, firm and distributed, a stable network with the property of resolving internal conflicts automatically concerning events, predictable and secure will be able to deliver much more structured and understandable results for users who make use of the tool based on the arbitration clause⁴⁸.
- 70 To conclude, it should be noted that, for the coding of the arbitration clause, a programming language is required, which depends on the specific context in which the coding is to be performed. However, the most widely used programming language for arbitration clause encoding is the *Solidity* software running on the *Ethereum* platform (which develops a virtual machine called EVM [Ethereum Virtual Machine]), which has the ability to run block chain software. In the virtual machine, smart contract codes are processed which guarantees accurate and reliable results, allowing any user to become a developer user and be able to access the blockchain⁴⁹.
- 71 It should be added that, the *Solidity* programming language defines a structure called „*Arbitration Clause*“, which includes the following fields: *arbitrator*: the address of the arbitrator or arbitration court designated in the clause; *arbitration Fee*: the amount of *ether* (Ethereum's native cryptocurrency) that the parties agree to pay upfront to cover the arbitration costs; *deadline*: the deadline for initiating arbitration after a dispute arises; *dispute Resolution*: a link to the detailed description of the dispute resolution process agreed by the parties; and *jurisdiction*: the applicable jurisdiction in case there is a dispute that cannot be resolved through arbitration.
- 72 Taking the above, and comparing the model arbitration clause offered by the Arbitration Rules of the United Nations Commission on International Trade Law⁵⁰: “Any dispute, controversy or claim

arising out of or relating to this contract, its breach, termination or invalidity, shall be settled by arbitration in accordance with the UNCITRAL Arbitration Rules”(31). If a dispute, controversy or claim arising out of or relating to this contract, its breach, termination or invalidity shall be settled by arbitration in accordance with the UNCITRAL Arbitration Rules”(31), it should be written in a Ricardian contract, following Boolean logic: “If a dispute, controversy or claim arising out of or relating to this intelligent contract shall be settled by the Tribunal (*arbitrator*) within 24 hours of its non-performance (*deadline*) in accordance with the UNCITRAL Arbitration Rules (*dispute Resolution*). Each party shall pay the amount of ... (as the parties may agree) (*arbitrationFee*). If the arbitral tribunal does not have jurisdiction, it shall be decided by the local *jurisdiction*.”

- 73 However, there are other types of arbitration clauses offered by different arbitration centres with along track record in the field. The model clause provided by the American Arbitration Association⁵¹ establishes the following model:

Any controversy or claim arising out of or relating to this agreement, or the breach thereof, shall be settled by arbitration administered by the American Arbitration Association in accordance with its Commercial Arbitration Rules, and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof.

- 74 From the above model a model Boolean logic clause may be suggested: If (controversy or claim arising out of or relating to this contract) then, Resolve by arbitration administered by the American Arbitration Association in accordance with its Commercial Arbitration Rules. Register judgment on the award rendered by the arbitrator(s) in any court having jurisdiction thereof.

48 Juan P Valencia, ‘Derecho, tecnología e innovación block-chain y contratos inteligentes’ (2020) 8(16) *Revista de Investigación en Tecnologías de la Información* 46–56 <https://dialnet.unirioja.es/servlet/articulo?codigo=7576622>.

49 J Romero Solís, *Aplicaciones de Contratos Inteligentes en Ethereum* (thesis, Universidad Carlos III de Madrid 2019) <https://e-archivo.uc3m.es/handle/10016/29653>.

50 UNCITRAL, *UNCITRAL Arbitration Rules* (2021) https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/es/21-07999_ebook_s.pdf.

51 American Arbitration Association, ‘Standard Arbitration Clause’ (2024) <https://www.adr.org/Clauses> accessed 27 August 2024.

75 The London Centre for International Arbitration (LCIA) provides the following model:

Any dispute arising out of or in connection with this Agreement, including any question as to its existence, validity or termination, shall be referred to and finally resolved by arbitration under the LCIA Rules, which are deemed to be incorporated by reference in this clause.

76 In view of the above, the following model is proposed: The number of referees shall be [one/three].

The seat, or legal place, of arbitration shall be [City and/or Country].

The language to be used in the arbitration proceedings shall be [].

The applicable law of the contract shall be the substantive law of [].

If (dispute arising out of or in connection with this contract, including any question as to its existence, validity or termination) then

Resolve by arbitration under the LCIA Rules, which are deemed to be incorporated by reference into this clause.

If (number of arbitrators is one) then Select a referee.

If not,

If (number of arbitrators is three) then Select three referees.

Establish the seat of arbitration in [City and/or Country]. Determine the language to be used in arbitration proceedings. Apply the substantive law of the contract as specified.

Finally, the International Chamber of Commerce⁵² provides the model arbitration clause: “All disputes arising out of or in connection with this contract shall be finally settled in accordance with the Rules of Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with these Rules”.

If (disputes arising out of or in connection with this agreement) then

Make a final decision in accordance with the Rules of Arbitration of the International Chamber of Commerce.

Appoint one or more arbitrators in accordance with these Rules.

F. Conclusions

77 The article concludes that, despite the automatic nature and the promise of reducing contractual non-compliance that characterize *Smart Contracts*, they are not exempt from generating conflicts between the parties, highlighting the importance of arbitration as the ideal mechanism for the resolution of such disputes. The need to include properly codified arbitration clauses or agreements in *Smart Contracts* is justified, facing the challenge of ensuring that such codification faithfully reflects the will of the parties and maintains its legal validity. This is especially relevant in the absence of a parallel contract drafted in common language (Ricardian contract), which may compromise the effectiveness of the arbitration clause.

78 The research emphasizes the need to standardize the coding of the arbitration clause, using as a reference the Unified Modelling Language (UML) standards to design user interfaces that accurately reflect the requirements of the SCs and, therefore, facilitate the understanding and execution of the arbitration clauses by the endusers. This involves a multidisciplinary process that integrates the technical expertise of software developers with legal expertise, ensuring that contractual terms are clear, fair and enforceable, minimizing informational asymmetries and contractual imbalances, especially for consumers adhering to adhesion SCs.

79 Finally, a codified arbitration clause model is proposed that contemplates critical aspects such as the appointment of the arbitrator, arbitration costs, time limits for initiating arbitration proceedings, description of the process and applicable jurisdiction. This model is based on Boolean logic to ensure automatic enforcement under predefined conditions, providing a framework for the effective implementation of arbitration clauses in the *Smart Contracts* environment. Standardization and transnational regulation are presented as imperatives to ensure the effectiveness of *Smart Contracts* in arbitration, avoiding excessive restrictions that may inhibit technological innovation.

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52 International Chamber of Commerce, ‘Arbitration Clauses’ (ICC Spain 2024) https://www.iccspain.org/wp-content/uploads/2024/02/Arbitration_clause_SPA.pdf accessed 27 August 2024.

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