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Smart Contracts and Alternative Dispute Resolution

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TABLE OF CONTENTS

ABSTRACT

The use of Smart Contracts (SC) has increased in recent years and their benefits have attracted companies, among others, as smart contracts are perceived to bring various benefits to processes such as speed, security, low cost and accuracy. The current automation process of legal transactions, and SC platforms, in particular, seem to contradict contract law principles and legislation and pursue business efficiency goals, exclusively. This thesis aims to investigate how could the integration of Alternative Dispute Resolution (ADR) processes within the SC platforms address some of the critical legal risk management issues that may arise, and how? This question will expand the discussion about the reciprocal benefits that ADR and technology may bring about to one another. The automation of legal processes and services keeps growing enormously, SC platforms have become more common, and continue to challenge long established contract law principles. The study shows that SCs should be altered to be "prepared" for the law and the absence of human centeredness is on center given that these attributes influence dispute resolution the most, as explicit DR methods necessitate seeking a balanced solution that is satisfactory to both parties. It may be assumed that a more editable SC code would be needed for platforms to integrate dispute resolution systems or models as there would be an option to modify the contracts easier. This may diminish the irreversibility of transactions and adjustments that could be needed in contract relationships. SCs and other automating technologies have a huge potential that can be exploited to the advantage of all parties involved. This thesis highlights the possible flaws of SC from a legal point of view and considers how much human presence is needed in their disputes and how automation in disputes could be made to work.

Keywords: Smart Contract (SC), Alternative Dispute Resolution (ADR), Dispute Resolution (DR), Blockchain, code, Distributed ledger technology (DLT)

INTRODUCTION

While the idea of SCs reached the legal debate just a few years ago, the topic has already spawned an array of strikingly divergent perspectives. Smart contracts are digital contracts that enable decentralized consensus-based terms that are secure and typically self-monitoring with automatic execution[1]. Some believe that SCs should be completely incorporated into current contract law[2]. While others may think it will take a long time before SCs can work as a "standalone" tool to survive contractual disputes.

SC have received a lot of attention in recent years, thanks to the growing success of Blockchain technologies. Decentralization, programmability, and immutability are features of Blockchain-based smart contracts. It's commonly used in banking, insurance, and other industries.[3] They are systems that run strictly as designed to be run by the people who developed them at the most essential stage. The value of the SCs is most apparent in business partnerships, in which some sort of arrangement is typically enforced in order for all parties to be confident of the result without the intervention of an intermediary.[4] These SCs are regarded as a new technology that is emerging quickly due to the fact it offers many opportunities and benefits. The automation process keeps growing enormously, SC platforms (such as Kleros[5] and Bitrated[6]) become more common, contract law principles, and SC principles are being challenged.

For a SC to be legally correct, it must follow the requirements established in the applicable law.

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[1] Cong, L. W., & He, Z. (2019). Blockchain disruption and smart contracts. *The Review of Financial Studies*, 32(5), 1761-1762

[2] Woebbeking, M.K., (2019). The impact of smart contracts on traditional concepts of contract law. *J. Intell. Prop. Info. Tech. & Elec. Com. L.*, 10, 105

[3] Mik, E., (2017). Smart contracts: terminology, technical limitations and real world complexity. *Law, Innovation and Technology*, 9(2), 269-270

[4] Sun, T., & Yu, W. (2020). A Formal Verification Framework for Security Issues of Blockchain Smart Contracts. *Electronics*, 9(2), 4

[5] Lesaege, C., Ast, F., & George, W. (2019). Kleros Short Paper v1.0.7. *Kleros*, https://kleros.io/static/whitepaper_en-8bd3a0480b45c39899787e17049ded26.pdf , 1-2, Accessed: 21.07.2020

[6] Bitrated, Retrieved from: https://www.bitrated.com/faq , Accessed: 06.12.2020

SCs ultimately change our contract comprehension. The role of dispute resolution processes also shifts as contractual ties become self-sufficient. Increased problems are often associated with the boundary of contract law and procedural law when SCs fluctuate between the original contract and its execution. For instance, because the contract is immediately executed, the position of dispute settlement provisions needs to be reassessed. Dispute resolution provisions are expected to lose at least some of their present value in cross-border commercial contracts. Koulu points out that in fact, it can be programmed to overcome future problems resulting from the contract performed.[7] SCs could offer significant advantages under such conditions, for example, where there is no confusion or where output management may otherwise be especially expensive.[8] It remains to be seen if SCs can handle cases where not everything is the same as "walking on roses" and disputes could occur between the parties.

While the literature is consistent on that Blockchain technologies create financial and legal difficulties due to the procedural and contractual tensions they impose, they can also increase and encourage new institutional options for dispute resolution. There are said to be more possibilities for the creation of various private decentralized dispute resolution systems in the future although many do not see the fragmentation necessary.[9]

This is a theoretical thesis that uses the standard qualitative methods of the legal research methodologies to analyse academic literature and European Law, in terms of ADR and Contract Law. Based on the analysis, changes are expected from the European institutions in the way the SCs and Blockchains are managed from a legal perspective. The topic is relatively new and underresearched in the context of dispute resolution. However, its importance is expected to increase due to the technological developments of the last months regarding the digital platforms and ecosystems that will certainly challenge the field of traditional contract law and the handle of disputes

The mixed concept of paper and coding emerges to be the direction contract law is shifting when it comes to SCs. Although they offer the aforementioned benefits, of swiftness and cheapness, they

[7] Koulu, R. (2016). Blockchains and online dispute resolution: SCs as an alternative to enforcement. *SCRIPTed*, 13, 55-56

[8] Sklaroff, J. M. (2017). Smart Contracts and the cost of inflexibility. *U. Pa. L. Rev.*, 302

[9] Wagner, E., Völker, A., Fuhrmann, F., Matzutt, R., & Wehrle, K. (2019). Dispute resolution for smart contract-based two-party protocols. *In 2019 IEEE International Conference on Blockchain and Cryptocurrency (ICBC)*, 424-426

are not yet ready to render conventional contracts worthless.[10] This analysis will determine how SCs could be made to work in everyday situations, including those where the solution is not always easy to find.

The core assumption of this thesis is that the available automated transactions or SC applications in digital platforms pursue efficiency goals at the expense of contract law principles and legislation. Nonetheless, the study shows that SCs should be altered to be "prepared" for the law as explicit DR methods necessitate seeking a balanced solution that is satisfactory to both parties.

The first chapter explains the basics of SCs and Blockchain, how they operate, and what should be done for them to be more consistent within the contractual field. The second chapter discusses ADR, and how does it apply and work currently within the area of technology, and more concretely in regard to SCs. SCs do not always operate the way they should. The issues lie in the field of modifying the contents of a SC when a dispute appears. This may require an interest in the preparation of new professionals that are specialists in both law and software engineering.

[10] O'Reilly, S., & McCarthy, A. (2019). SCs – A Possible Shake-up in Traditional Contract Law. Ronan Daly Jermyn, https://www.rdj.ie/blog/post/smart-contracts---a-possible-shake-up-in-traditional-contract-law/ , Accessible: 21.07.2020

2. THEORETICAL BACKGROUND

With the the usage and diversity of smart contract implementations, the controversy about the legal consequences of this concept has increased. Legislators have taken an interest in Blockchain technologies and smart contracts since they have started to recognize legal uncertainties and make the initial efforts to fix them by legislation.[11]

Despite the fact that contract law is a relatively mature field of law and contractual independence is generally recognized in the majority of jurisdictions, the concept of self-executing applications that instantly and autonomously applies contractual provisions on a peer-to-peer and immutable basis remains constitutionally controversial. When Blockchain-based smart contracts gained attention, the legal controversy around them became more heated. Legal experts and professionals interested in this debate have questioned the legal feasibility and legal status of Blockchain-based smart contracts, as well as the impact of smart contracts on current legal structures and legal systems.[12]

The European Union has recognized smart contracts in its regulatory action, recognizing that there is confusion about their legitimacy and enforceability in cross-border circumstances. The draft report of the European Parliament's Committee on Legal Affairs makes recommendations to the Commission regarding a Digital Services Act that will adapt commercial and civil law rules for commercial entities that operate online, and it has been emphasized that the upcoming Digital Services Act provides an opportunity to assess the requirements for smart contracts to be considered legally valid. The European Parliament's Committee on Legal Affairs requested the European Commission to conduct an assessment of the implementation and usage of distributed ledger technologies, including Blockchain and, in particular, smart contracts, focusing on the legitimacy and compliance of smart contracts in cross-border contexts, and to propose a suitable

[11] Ferreira, A. (2021). Regulating smart contracts: Legal revolution or simply evolution? *Telecommunications Policy*, 45(2), 1-2
[12] *Ibid.* p 6

legal structure.[13] While there has been substantial legislative activity in a few countries in the EU, only a few have formed a regulatory response and enacted legislation committing to smart contracts or regulating them in any context (Law Decree No 12/2019, Italy[14]). As stated in the proposal SCs that are operated through DLTs can be considered as SCs (conditions will be defined by AGID (Agenzia per l'Italia Digitale)). It has not been clarified if SCs fall into the definition of contracts under Italian Law.

2.2 Smart Contracts

SC is a computer program that confirms and executes its terms upon the event of predetermined conditions or the fulfillment of certain procedures.[15] It can be stated that a purchase from a soda machine creates a primitive form of a SC due to the fact that it involves the autonomous transfer of ownership of property. SCs are imagined as conceivably ruling out the requirement for external authorization of legal agreements, subsequently making business exchanges more effective because they could become less expensive, prompt, and increasingly effective. When the conditions in the code are met, the program triggers the necessary sequence of effects. For instance, a SC is intended to generate a response once an input is confirmed, and adding blocks to a virtual ledger could uphold installment through the circulated record. In case of failure of payment, it could start recuperation of the good or suspension of the service.[16]

The paradigmatic method to utilize automated technology in SC design is that a client proposes a particular SC by making it accessible in the framework. The registry of transactions has a distinguishing proof number and capacities as a self-sufficient element inside the framework, to some degree like how a site may work on the Internet. Another client may then "acknowledge" the SC by imparting to it some way or another, for instance, by making an ostensible installment to it.[17] The SC focuses on self-execution (one or more elements of the execution of the contract are automated), and it uses Blockchain to ensure that, after the parties have already formalized their

[13] European Parliament. (2020). Draft report with recommendations to the commission on a digital services act: Adapting commercial and civil law rules for commercial entities operating online. *Committee on Legal Affairs*, 2020/2019(INL)
[14] Law Decree No 12/2019, Italian Law, https://www.lexology.com/library/detail.aspx?g=f3dea1c7-072f-4d48-b946-0476ec5adb08, Accessed: 04.05.2021
[15] Giancaspro, M. (2017). Is a 'SC'really a smart idea? Insights from a legal perspective. *Computer law & security review*, 33(6), 825-826
[16] *Ibid.*, p 826
[17] Tjong Tjin Tai, E. (2018). Force majeure and excuses in SCs. *European Review of Private Law*, 26(6), 787-804

contract, the transactions protected by that contract are correct and can not be altered by any side without the agreement of the other parties. They use code through data feed technology (if A occurs, then Y runs automatically) to decide the outcome of a SC. This does not mean they would be comparable to actual contracts since SCs are nothing but technological tools for the execution of transactions currently. If/then clauses are one of the most fundamental building blocks of any programming system and are conveniently applicable to contractware in general and SC in particular.[18]

This innovation has a huge and extending number of potential uses, for example, trading in financial-related instruments, syndicated loaning exchanges, and securities settlement. SCs are proposed to work in co-operation with Blockchain technology to authorize exchanges on the Blockchain. SCs are a stage past regular electronic contracts in that the genuine agreement is epitomized in programmable code, as opposed to English or another traditional language. [19] However, the foundations of the law of obligations and contracts underlining all those potential uses are shaken.

SCs are not novel in that they should consist of a recognizable agreement between parties with the ability to settle on that agreement. What's more, financial institutions have been utilizing mechanized computer protocols to settle exchanges without human intercession for a very long time which emphasizes the fact that a SC is just a transactional tool, not a contract and should not be given the status of anything else.[20]. SCs are automatable by computer, but a couple of segments may require human data and control. Enforceable either by legal approval of rights and responsibilities or through deliberately planned execution of computer code. It has been understood that for a "SC", to be considered so, at least some parts of the agreement are fit for being automated via computational methods otherwise it could not classify as “smart”.[21]

A legal contract is a unique legal instrument. Its fundamental prerequisite is - as set out in Article 2 of Principles of European Contract Law - the common articulation of goal by the parties.[22] Subsequently, a legal contract can be communicated in code and settled upon through messages

[18] McKinney, S. A., Landy, R., & Wilka, R. (2017). Smart Contracts, Blockchain, and the next frontier of transactional law. *Wash. JL Tech. & Arts*, 13, 324
[19] O'Shields, R. (2017). Smart Contracts: Legal agreements for the Blockchain. *NC Banking Inst*., 21, 179-181
[20] Clack, C. D., Bakshi, V. A., & Braine, L. (2016). SC templates: foundations, design landscape and research directions. *arXiv preprint arXiv:1608.00771*., 2
[21] *Ibid.*, p 1-3
[22] Principles of European Contract Law, Art. 2, https://www.trans-lex.org/400200 , Accessed: 07.04.2020

sent to a SC code on a Blockchain although it is impossible to codify the intention of the parties. In any case, there can be various reasons why a SC code probably won't be perceived as a legal contract. For instance, there may be clashing customer security rules, straightforwardness, or explicit structure necessities. [23] SCs bear the extra danger of legal vulnerability, specially because they are not contracts. SCs are not even deals or pacts, they are simply code on certain aspects of the contract that do not in fact exist outside the digital world.

The term "Smart Contract" was instituted before by Nick Szabo, autonomously of the idea of a Blockchain. His idea was to embed contractual clauses into automated systems: "*Today, Smart Contracts consist out of three possible aspects: the definition of contractual duties in the form of a computer program or algorithm, the execution of a legal contract by a machine and the transparent and secure combination of both aspects usually by means of DLT (Distributed Ledger Technology)*."[24] SCs are also commonly used in connection with many other programs in the Blockchain.

In fact, all individual contracts are inconsistent as it can not be clearly defined that any preconditions are connected with rights, obligations, and activities. These preconditions which may occur out of ambiguity can not be foreseen by any human being. There must be recognition of two types of insecurity: opportunistic conduct managed by human actions, which is more inevitable and thus manageable by negotiated conditions, and unpredictable incidents outside human control and sometimes beyond human awareness. Nobody can predict what is going to happen in the future because the information is limited.[25]

The more uncertain the context in which the deal takes place, and the farther out the date in which the outcomes of the deal must be produced, the less probable it is that any side will make reasonable assumptions on what could happen. Although, the uncertainty of terms in the wording of a contract is not nearly as harmful and definitive (people could ask, renegotiate, withdraw, sue and clarify) as the chain of command and execution that a SC automates. Most prediction models depend on historical data, whether the occurrence occurs attributed to variables not predicted or

[23] Erbguth, J., & Morin, J. H. (2018). Towards Governance and Dispute Resolution for DLT and Smart Contracts. In 2018 *IEEE 9th International Conference on Software Engineering and Service Science (ICSESS)*. IEEE., 46-51
[24] *Ibid*., p 45-51 (Szabo, N. (1994). Smart Contracts)
[25] Howell, B. E., & Potgieter, P. H. (2019). Governance of Smart Contracts in Blockchain institutions. *Available at SSRN 3423190*., 4

associated with historical data, then the strongest models focused on historical data would not be able to accurately predict it.[26]

2.3 "Smart" contract law

SCs could autonomously proceed as legal contracts if they could operate lawfully when associated with a legal contract (if the contracting terms meet the standards of Contract Law).[27] The idea of SCs raises various concerns and provokes when one attempts to apply the traditional principles of Contract Law. Also, such difficulties have a widespread nature, setting off profoundly of contract law arrangements, which are pretty much the equivalent to paying little attention to the law. The primary issue lies in the way that SCs are made and created in a specialized universe, without a legal considerations, in a similar way to the development of the Internet, that caused uncertainties in its early days. In other words, the programmer, the code, and the equipment, are not interested in the basic legal values or standards such as lawfulness, decency, and the protection of the weak parties. Conviction and adequacy prevail.[28]

Although SCs that take place within the context of a series of general rules applicable to those regulated by contract law, the failure of the code to capture and enforce the social and legal valuesis a major constraint. The extension of rules to the implementation of contract law is essential because while all contingencies can not be defined in advance, there is a mechanism for seeking a remedy in the case of conflicts or unforeseen results.[29] Placing a SC in a Blockchain does not set it apart or otherwise isolate it from the laws of a particular jurisdiction. In addition to meeting the conditions for enforceability, smart contracts must also be compatible with the legal framework specific to their jurisdiction.[30]

The need for obligations (comprehended in the exemplary legal sense) in SCs prompts that the entirety of the legal system related to the idea of 'commitments' exists. This applies to rules identifying with the method of execution and the outcomes of non-execution. This accords with

[26] *Ibid.,* p 4-5
[27] Kerikmäe, T., & Rull, A. (Eds.). (2016). The future of law and etechnologies (Vol. 3). *Springer International Publishing*., 138
[28] Savelyev, A. (2017). Contract law 2.0:'Smart'contracts as the beginning of the end of classic contract law. *Information & Communications Technology Law*, 26(2), 128-133
[29] Howell, B. E., & Potgieter, P. H. (2019). *supra nota 25,* p 6
[30] Mik, E., (2017). *supra nota 3,* p 287

the nature of SCs when all the arrangements are authorized by specialized code.[31] Dispute structure design goes past considering positive law while assessing needs, stakeholders, history and network, methods and frameworks, instruments, and progressively associated with a given circumstance. This encourages one to contemplate the conflict settlement framework, touchy to the unique needs and aspirations of a given socio-legal setting.[32] Parties to SCs, as a rule, intend to ensure their exchanges' security and energize adaptability of market activities, as both are basic points behind SCing.

The origin of legal regulation is not a system that controls SCs. But instead, computer code mimics the law because it is where the source of legal responsibility takes place and affects society.[33] SCs, or rather, the Blockchain technology does not alter or substitute laws, that still applies to the automation of contracts, whatever code is used. It follows that a crucial issue in distributing the power of executing transacions or delegating execution to SCs would be to ascertain which laws will need to be considered from the laying out of, because they will apply irrespective of the SC's code. Building the legal standards into the SC structure makes it possible for the SC to utilize the law, rather than trying to work against it.[34]

3. THE CHALLENGES AND OPPORTUNITIES OF SCS AND OTHER BLOCKCHAIN TECHNOLOGY AUTOMATION IN THE FIELD OF CONTRACTING

The term "smart" is interpreted corresponding to automatisation, and the way that the computer code has a level of self-determination – it can make quite a few (however maybe not all) choices, regardless of whether straightforward or complex, without necessitating human control. "Contract" is interpreted extensively to mean either a legal and enforceable contract, or an agreed timeline of

[31] Savelyev, A. (2017). *supra nota 28*, p 128-133
[32] Schmitz, A. J. (2020). Making Smart Contracts 'Smarter' with Arbitration. *American Arbitration Association website*. 6
[33] Jaccard, G. (2018). Smart Contracts and the role of law. *University of Geneva, Faculty of Law, Department of Private International Law*. Available at SSRN 3099885., 9-10
[34] Farrell, S., Machin, H., & Hinchliffe, R. (2017, February). Lost and found in Smart Contract translation—considerations in transitioning to automation in legal architecture. *In UNCITRAL, Modernizing international trade law to support innovation and sustainable development. Proceedings of the congress of the United Nations commission on international trade law* (Vol. 4)., 5-6

actions and choices that, in spite of the fact that not enforceable in law, cannot be messed with once began.[35] Most SCs can be written in a simple, procedural language, while certain terms of the contract may be self-executing. Compensation fees, insurance causes, and several other aspects of the contract may be streamlined and self-executed, although other rules exist beyond the Blockchain. If a person needs to determine when a condition is met, and the outcome of an automatic digital contract is activated, the contract is not necessarily "smart," as, like other contracts, rational human minds will vary.[36]

Approval of SC code is not only a question of running the code and watching that no mistakes happen. Nor is it a matter of observing that the net results are right as indicated by different numbers juggling formulae and operational rationale. Rather, it requires a comprehension of the semantics of the contract to give a lot of approval situations (for instance, a portion of these may be "consider the possibility that" situations, for example, "imagine a scenario in which party A makes an installment?", or "imagine a scenario where the accompanying succession of occasions was to happen?", while others may be situated in the viable experience of issues of law, for example, "if a portion of the proposed exchanges were to get illegal halfway through the contract, could the contract be changed or terminated?").[37] This may require an interest in the preparation of new professionals that are specialists in both law and software engineering.

History shows that programs do not always operate as designed to. The output of a SC may differ from the intentions of the parties, although the system provides a more optimal first approximation because computer code can be predicted according to a set of rules, where's the ambiguity in human interpretation is less robotic by default. SCs can be performed, modified, or breached. The performance phase has been made simpler as they offer a tool to solve ambiguity problems, although there exists a potential problem with imperfect performances. SC's most pressing issues lie in the field of modification. The law foresees certain reasons that will pardon a party from a performance or require a type of change. Difficulty and impracticability are two such reasons. At the point when a contract gets illicit after it is framed, at that point, the parties can be pardoned from execution, and there is commonly no solution for a wronged party. This represents an issue for the SC. At the point when a breach happens, the contract will be terminated.[38]

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[35] Clack, C. D. (2018). Smart Contract Templates: legal semantics and code validation. *Journal of Digital Banking*, 2(4), 1-5

[36] McKinney, S. A., Landy, R., & Wilka, R. (2017). *supra nota 18*, p 325

[37] Clack, C. D. (2018). *supra nota 35*, p 1-5

[38] Raskin, M. (2016). The law and legality of Smart Contracts. *GEO. L. TECH. REV.*, 309-311

Jurisdictional problems exist with respect to SCs since they work in conjunction with a centralized ledger, such as Blockchain. In particular, where is the distributed ledger stored if a disagreement arises? Blockchain often poses concerns regarding the right to distinguish the parties to a contract, despite the degree that the mechanism utilizing the technology stays confidential and could pose a number of potential problems relating to dispute resolution. The definition of the applicable law and the position of dispute resolution will be explicitly defined and decided upon by the parties to the SCs in order to be enforceable. Based on the scale of the system, members may enter into conventional agreements at the time of setting up the system by committing to certain general legal requirements, such as dispute resolution, law, and jurisdiction.[39]

Computer code must be absolutely and totally characterized, on the grounds that at root, it is a progression of on the off chance that directions that should all be understood and fixed by a computer. A SC cannot contain a term that makes them mean at the hour of execution and takes on another significance later.[40] Although its promising future, this technology will not work without a degree of risk. Among all digital files, cyberattacks are still there. The Distributed Autonomous Organization was a SC designed to merge investment funds. At one point, it had a cryptocurrency valuation of over $150 million. A hacker found a software flaw and then depleted the money. Instead of infiltrating the protection mechanisms of the SC, the unauthorized party clearly found a flaw in the application. It is analogous to the manner in which certain conventional contracts may be abused by their own loopholes.[41]

Compliance problems can limit the potential benefits of SCs. Although multiple undisputed transactions involving SCs are likely to go ahead on the basis of an autonomous electronic compliance, there is likely to be a need for human involvement in settling legal disputes.[42]

SCs can offer significant contract enhancements under such conditions, for example, where there is no confusion or where output management may otherwise be especially expensive. Then again, companies can implement SCs in some areas of their market or handle a given category of routine

[39] O'Shields, R. (2017). *supra nota 19*, p s.191
[40] Sklaroff, J. M. (2017). *supra nota 8*, p 291
[41] O'Reilly, S., & McCarthy, A. (2019). *supra nota 8*
[42] O'Shields, R. (2017). *supra nota 19*, p 190

transactions. Yet we recognize today that companies find contractual stability to be a core strategic problem.[43]

According to their proponents, SCs are accurate (in terms of minimizing human-made mishaps and the sense of the integrity of their records), standardized (unified terms and conditions on a certain industry, quickly accessible (contracts are easily accessible through the database), secure (digitized contracts use data encryption that is hard to bypass), and cost-efficient (avoiding expensive dispute resolution methods).[44]

The terms and conditions of legal contracts in a clear description eliminate uncertainty and minimize exchange mistakes. In an ideal situation, SCs should leave no space for misinterpretation. The digitization of legal contracts presents an opportunity to standardize the terms and conditions of the contracts and to manage them symmetrically across the industry, great for trade and very dangerous for consumers and the public. If the documents have been digitized and securely processed, they will be provided available and open to all concerned parties. This tends to give the parties to the contract a consolidated view and reduces disputes that may arise from them. It is distinct from conventional paper-based contracts that can take hours to check the conditions of entry to the contract.[45]

The latest method makes the contract management a key, indeed, it is economically sound, rational, but humans hardly ever rational it in decision making, and it makes the cycle effective and reduces the burden on working parties. SCs usually utilize the highest degree of data encryption possible, rendering them thoroughly safe and stable. Contracts, once digitized, are being processed securely and backed up for years to come, meaning that they can be retrieved by contract-related counterparties anytime they need to. SCs are using knowledge to enhance and turn the operating cycle more effective. They reduce the operating cost and need less personnel to handle the contracts. That involves a potential removal of prosecutors and intermediaries. Contract integration and digitization of key contract terms allow potential contracts to be signed digitally rather than offline by e-mail or by telephone. It shifts the contract management market paradigm

[43] Sklaroff, J. M. (2017). *supra nota 8*, p 302
[44] Shah, M., & Samra, R. (2019). Smart Contracts for the digital economy. *Journal of Securities Operations & Custody,* 12(1), 83-84
[45] *Ibid*, p 83-84

entirely. Digitizing and centrally maintaining business contract knowledge will allow market participants to collectively engage in contract predictive capabilities.[46]

Blockchain innovation alludes to a technique wherein parties obscure to one another can mutually keep up and alter databases in an altogether decentralized way, with no middle person party practicing focal control.[47] Blockchain is an ordered block list that labels each block by its hash. Each block corresponds to the block that came before it, culminating in a series of blocks. Each block is made up of a series of transactions. If a block is formed and appended to the Blockchain, the transactions in that block cannot be altered or reversed. This is to maintain the fairness of transactions and avoid a double-spending issue.[48] One of the critical highlights of Blockchain agreement models is their capacity to keep up a uniform view on the situation and the request for occasions with no centralized body directing them from above. On account of the decentralized consent, the Blockchain system keeps up its understanding of the substance of the framework, regardless of whether negating changes were all the while endeavored.[49] Through understanding the system's potential to reduce counterparty and arbitration risk, more market actors will obtain a solution in real-time. It depends on how well the oracle functions and its program is made, and still it does not compensate for the loss of freedoms and control over the processes and awareness The underlying SC deal thus has a greater legal impact than the rule of a traditional contract.[50]

There are two different Blockchain categories: public and private. In a public Blockchain, anyone can open, read, and attach information with an internet connection and right applications. It is also available to the public. This modality is perfect for cryptocurrencies, including Bitcoin[51], Ethereum[52], etc. to allow everyone access and run such principles. In private, instead, the exposure and consent of other participants are regulated. In this case, participants are representatives, for instance, between a company and its branches, of an association or community of an organization.[53]

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[46] *Ibid.* p 83-84
[47] Lauslahti, K., Mattila, J., & Seppala, T. (2017). Smart Contracts–How will Blockchain technology affect contractual practices?. *Etla Reports*, (68)., 6-7
[48] Alharby, M., & Van Moorsel, A. (2017). Blockchain-based smart contracts: A systematic mapping study. *arXiv preprint arXiv:1710.06372*. 126
[49] Lauslahti, K., Mattila, J., & Seppala, T. (2017). *supra nota 47,* 6-7
[50] Liu, Y., & Huang, J. (2019). Legal Creation of Smart Contracts and the Legal Effects. In Journal of Physics: Conference Series (Vol. 1345, No. 4, p. 042033). *IOP Publishing*, 4
[51] https://bitcoin.org/en/faq , Accessed: 16.11.2020
[52] https://ethereum.org/en/what-is-ethereum/ , Accessed: 16.11.2020
[53] Tasca, P., Aste, T., Pelizzon, L., & Perony, N. (2016). *Banking beyond banks and money. A guide to banking services in the twenty-first century*. Switzerland: Springer, 234-236

If looking at how Blockchain ledgers operate, it's worth looking at the conventional ledgers. For decades, banks have been using ledgers to manage loan processing files, and governments have used them to hold land ownership records. There is a central body the bank or the government agency – who oversees the modifications to the transaction record such that they can determine who owns what at any particular moment. It allows them to test that new sales are valid, whether the same 100 € are not spent again and whether houses are not rented by individuals who do not own them. Because users trust the Ledger Manager to verify transactions correctly, people can buy and sell from each other even though they have never met before and do not trust each other. The middleman also controls access to the ledger information. They can agree that everyone can find out who owns a house, but only account holders can test their balance. Such ledgers are called "centralized" (there is a middleman, trusted by all users, who has complete power of the network and mediates any transaction) and black-boxed (the operation of the ledger and its data are not completely accessible to its users)[54]. Digitization has made these ledgers more straightforward and easy to use, but they in fact remain as centralized and black-boxed.[55]

Bitcoin was the Blockchain system's first production. In the following years, many others were made, different from the Bitcoin platform in various ways. A number of them like Ripple that eases currency exchange between financial services and providers are optimized for specific purposes. The others, for example, Ethereum, were created as platforms. These Blockchains possess a native cryptocurrency token that can be exchanged. The primary purpose of their currencies is to encourage activity. Another class of systems, called ledgers that are permitted, have no cryptocurrency because they are made for groups of firms to share transactions or advice.[56]

The fundamental design of autonomous global SCs, thanks to the use of Blockchain technologies, has the ability to reduce much of the concern that existing regulations seek to mitigate according to Liu, Y., & Huang, J. (2019). As for example, cross-border payment processes in Blockchain greatly minimize transaction settlement and risk by handling financial transactions in real-time, the capacity of the network to satisfy the comprehensive specifications would reduce many of the risks by making access to financial market services less efficient.[57]

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[54] Boucher, P. (2017). How Blockchain technology could change our lives: In-depth analysis. European Parliament, 5
[55] *Ibid.,* p 5-6
[56] Werbach, K. (2018). Trust, but verify: Why the Blockchain needs the law. *Berkeley Technology Law Journal*, 33(2), 498-499
[57] Liu, Y., & Huang, J. (2019). *supra nota 50*, p 4

Blockchain-based SC platforms are believed to possess great promise and add transparency to software that is distributed. Ethereum is a prime example of this kind of platform. It offers powerful programming languages like Solidity to build decentralized applications with ease.[58]

[58] Bünz, B., Agrawal, S., Zamani, M., & Boneh, D. (2019). Zether: Towards Privacy in a SC World. *IACR Cryptology ePrint Archive, 2019*, 1

4. ALTERNATIVE DISPUTE RESOLUTION

Alternative Dispute Resolution (ADR) is meant to settle conflicts without going to the courts. The most popular modes of ADR include assisted negotiation — often at the core of modern ADR according to Barnett, J., & Treleaven, P. (2018), the mediator attempts to build communication between the parties where trust has been eroded or prevent this from happening. The aim is a "win-win" outcome and that the parties drop their trapped positions and seek to move on with a positive solution for all parties. An example is a case of divorce proceedings.[59] Mediation allows parties to settle their disputes. The role of the mediator differ in function of the parties and needs of the respondents, the type of questions and of the mediator's personality and abilities. Mediators have several tasks to carry: to get parties to speak to one another, to set an agenda, to help people realize their issues, and to come up with potential solutions.[60] The deal is simplified to written and is a contractual document until the agreement is made. Mediation is, in many respects, a direct opposite to traditional dispute or arbitration where the winner and the loser usually pay the entire costs of the process.[61] Arbitration instead is a process— where a third party named in advance decides to accept the conclusions and then attend the trial hearing where both parties have the chance to provide facts. The binding verdict of a court or jury substitutes the binding ruling of any third party, such as an arbitrator, arbitrator, or private judge, equivalent processes in the regular trial. Parties are often subject to a clause in their contract to arbitrate conflicts that result from their business.[62] The verdict of the arbitrators shall be regulated by the arbitration laws of a country or by international organizations 'arbitration regulations. Early impartial judgment – were 'independent,' mostly retired judges, listen to a review of the cases of each side and determine the facts without duty. Compromise and future discussion should be used as a basis.[63]

[59] Barnett, J., & Treleaven, P. (2018). Algorithmic Dispute Resolution—The Automation of Professional Dispute Resolution Using AI and Blockchain Technologies. *The Computer Journal*, 61(3), 400-402
[60] Carver, T. B., & Vondra, A. A. (1994). Alternative dispute resolution: Why it doesn't work and why it does. *Harvard Business Review*, 72, 122
[61] Barnett, J., & Treleaven, P. (2018). *supra nota 59,* 400-402
[62] Carver, T. B., & Vondra, A. A. (1994). *supra nota 60,* 122
[63] Barnett, J., & Treleaven, P. (2018). *supra nota 59,* 400-402

"*Two major types of dispute resolution exist: (1) adjudicative resolution, such as litigation or arbitration, where a judge, jury or arbitrator determines the outcome, and (2) consensual resolution, such as mediation, conciliation, or negotiation, where the parties attempt to reach mutual agreement.*"[64]

Dispute resolution and contracts have been described as the most crucial legal challenges posed by companies, as the primary sources of legal conflicts are traditionally understood to be discrepancies in understanding contracts and defects in their design. ADR is not only a private way to handle disputes but it is born in a private agreement or a contract. Both, the contracts and their ADR provisions are the expression of contractual freedoms and a good match to one another. In the interconnected world of trade and considering the growing automation and privatization of DR systems, ADR and SCs should evolve together be it for the proper resolution of SC disputes (arising from the implementation of that technology or its use) or for the automation of DR and use of SCs in ADR processes.[65]

4.1 The influence of Blockchain

Any contract is vulnerable to disputes, concerning the legitimacy of the contract, the translation or coordination of its terms, or breaks of its commitments, or approaches to manage surprising conditions.[66]

And the question that remains unanswered is: can SCs be recognized and enforced by the jurisdiction-based courts after they have been already executed, and how (as transactions)? When parties take part in a SC, they need to figure out how the possible disputes will be resolved. Many techniques of those disputes have been resolved as being a question of governance.

Blockchain may not simply make financial and legal difficulties through the pressures of code and deficiency of contracting yet may likewise boost and encourage new dispute resolution options. Therefore, a possibility exists to create new private decentralized dispute resolution systems or DR

[64] *Ibid.*, p 383
[65] Solarte-Vásquez, M. C., & Nyman-Metcalf, K. (2017). Smart Contracting: a multidisciplinary and proactive approach for the EU digital single market. *Baltic Journal of European Studies*, 7(2), 209
[66] Governatori, G., Idelberger, F., Milosevic, Z., Riveret, R., Sartor, G., & Xu, X. (2018). On legal contracts, imperative and declarative Smart Contracts, and Blockchain systems. *Artificial Intelligence and Law*, 26(4), 383-385

as a standalone provider, and embedded DR mechanics coded to contracts. The embedded kinds of DR utilize diverse approaches of adjudication and skill to arrive at conclusions (e.g., a pre-dispute observation that could alter SC code while implementing to prevent possible disputes). Both of these unique approaches are not always exclusive as, in steps of an automatic workflow, they are sometimes united.[67]

Although the modes of legal activity on Blockchain networks are getting more straightforward, the regulatory mechanisms are not. As said by Goldenfein, J., & Leiter, A. (2018) the contemporary development of legally permissible transactions is thus the production of a catalog of future contributions to the technology. The conflict processes that should be set in order to settle conflicts over these transactions are fundamentally deciding the jurisdictional existence of such systems. So the form of legislation that is changing, the form of activities that are allowed so forbidden, and the processes and mechanisms of dispute settlement that are engaged are all intensely social and political (as well as technical) concerns.[68]

Currently, there are two ways that may help solve SCs disputes. The strategy requires that SCs function within the Contract law framework, also may be settled by the courts or present Alternative Dispute Resolution (ADR) processes.[69] Dispute settlement can take several forms, of course. This just means a definitive verdict in a disagreement. It may be brought about by arbitrary decisions of the regulatory bodies, or it may be brought about by judicial interference. However, the technological and ethical form of these conflict processes is yet to be determined.[70]

Many of the legal and regulatory issues are liability (as a result of lack of intermediaries regulators may face many forms of difficulties), accountability (any participant will take responsibility for the fact that every participant takes his own risk because no jurisdiction exists to track or control transactions), ADR (no central entity, which involves a rethinking of traditional conflict management mechanisms), compliance (difficult to arrange all forms of transactions through complete dependency on a Blockchain) and cross-competence (as the Blockchain nodes may be

[67] *Ibid*., p 8-16
[68] Goldenfein, J., & Leiter, A. (2018). Legal engineering on the Blockchain:'Smart Contracts' as legal conduct. *Law and Critique*, 29(2), 145-146
[69] Allen, D. W., Lane, A., & Poblet, M. (2019), *The governance of Blockchain dispute resolution*. Available at SSRN., 2-16
[70] Goldenfein, J., & Leiter, A. (2018), *supra nota* 68, p 145-146

found worldwide). Consequently, it is vital to have consistent legal and regulatory protection to ensure legal standing for Blockchain transactions.[71]

Dispute resolution technology should be seen as the inclusive concept of ICT applications that encourage various conflict management aspects. Via legal and judicial portals, diagnostic tools, and chatbots these applications can allow access to general legal assistance easily. Dispute resolution technology is a complex field, and different implementations frequently overlap, which makes it difficult to resolve distinctions between court appeals and legal software.[72]

The buyer and seller appoint, ahead of time, a trustworthy representative to serve as an arbitrator for their deal. The buyer will then make the payment to a 2-of-3 multi-signature address, which will be locked before the purchaser and the seller agree to open it. Since an agreement and a trustworthy agent have been negotiated, a new trade will be established by the purchaser. Both parties are expected to check and approve their involvement in the exchange. The customer is asked to make the payment to a multi-signature address. The seller can ensure that the multi-signature payment is secured and the buyer receives the goods/service. The transaction is now frozen for the remainder of the trade until two of the three parties agree to unlock it - buyer, seller, and trust agent. This could go two ways: the buyer & seller accepts and releases the money to the control of the seller when everything goes well. In this event, no interference by the trust agent is needed. The trust agent may interfere, review the case and determine which party to side with when a dispute occurs, whether refunding the payment to the customer or releasing it to the seller.[73]

As a prime example, Kleros is a P2P court network that aims to settle conflicts over the Internet. It is an Ethereum conflict settlement scheme focused on the concept that the parties that enter into business relationships under which any money transition is carried out under an Ethereum contract. Instead, in the event of a conflict between the parties, a set of jurors are randomly chosen to decide on the case by a weighted token method and are supported by a process based on the Schelling model. Kleros requires its jurors to decide over a variety of preset choices, which require definitive decisions in particular. One of the most impressive features of Kleros is that it requires a scheme of appeals such that the juror commitment can be reduced just though the defense against future

[71] Rizal Batubara, F., Ubacht, J., & Janssen, M. (2019). Unraveling Transparency and Accountability in Blockchain. *In Proceedings of the 20th Annual International Conference on Digital Government Research*, 212

[72] Koulu, R. (2018). *Law, Technology and Dispute Resolution: The Privatisation of Coercion*. Vol. 1. London: Routledge, 60-62

[73] https://www.bitrated.com/faq , Accessed : 06.12.2020

threats becomes equal to the number of jurors participating in the probable appeal. The situation of Kleros can entail significant initiative by the legal entity to be evaluated.[74] Once clients join, they determine how many judges and which judge will rule on their deal in the case of a disagreement. The aim is to pick a kind of tribunal specialized in the subject matter of the contract.[75]

There are only a few platforms like these on the market. This shows that there are two common "classes" depending on the amount of automation. Taken together, the relationship between ADR and Blockchain from a business perspective in the use of technology in DR shows that there will be multiple different approaches to ease DR in SC platforms.

4.2 Contradict between SC platforms and legislation

Although it may be convenient to conclude that SCs should be regarded as any other contract, a quick examination of their particular existence and the numerous existing rules of contract law reveals that there are likely to be certain theoretical and functional complexities and contradictions.[76]

Not all SCs conform to the legal specifications or features of a typical contract. These forms of specific SCs, which, for example, are schemes under which various parties do not show explicitly and which are not, under fact, of a contractual nature to begin with. If the purpose can not even be indirectly identified between the parties (whether there is one), the SC does not represent a contract of legal consequences and is no more than a computer system embedded into the Blockchain. The variety presented in SCs may give rise to various legal issues for which the effects may be difficult to assess at this stage.[77] Presently, the main method for controlling SCs is by all accounts to reset the framework to keep away from further harm. In any case, this does not give real choices to the questions or solutions for those hurt. At the end of the day, this is a measure to "quit dying", and it does not resolve the conflicts.[78]

[74] Lesaege, C., Ast, F., & George, W. (2019). *supra nota 4*, p 1-2
[75] *Ibid.* p 3
[76] Giancaspro, *supra nota 15*, p 828
[77] Lauslahti, K., Mattila, J., & Seppala, T. (2017), *supra nota* 47, p 21 (Hemmo, Mika (2003): Sopimusoikeus I; *Talentum media Oy, Helsinki*. p 396)
[78] Schmitz, A. J. (2020). *supra nota 32*, p 5

In order to study the applicable domestic law regulatory structure, Blockchain's SCs do ought to recognize the related international laws and treaties. It allows regulatory bodies in various jurisdictions to determine the issues resulting from contradictions between applicable legislation. To decide how the risks of introducing Blockchain technologies to contract sectors are protected under a robust legislative system, regulatory authorities must be proactive in handling these possible problems. Since Blockchain SCs are black-boxed, vulnerability is applied to others, including underdeveloped legal structures.[79]

When it is understood that in certain situations, but not all, SCs written in code form are known as legal contracts or represent complete transactions, the issue of who will be the judge would eventually emerge. Because there is no blueprint for classification or case law today, a significant issue from the point of view of regulation is whether the public body has or will have the technological expertise and the ability to evaluate the legal nature of SCs on a case-by-case basis or on a broader scale. Would it be sufficient for public or government institutions to be liable for clarifying the legal status of SCs? The problem emerges when companies can take pre-emptive steps and develop model contract terms that promote the use of automation in SCs styles.[80]

SCs do not take into consideration the social dynamics of contracting; indeed, they are not built to do so. As Levy, K. E. (2017) explained: "*We might think of SCs as book-smart, not street-smart: while tey may facilitate technically perfect and seamless implementation of agreements, and lower transaction costs, they fail to understand or integrate the social world*."[81] The social pressure required to establish and execute a "dumb" contract may be highly functional — by maintaining autonomy, promoting cohesion, communicating cultural norms, and the like. Blockchain-based contracts depend on diligent pre-specification of conditions and automatic compliance of obligations. Such contracts thereby place a degree of inflexibility on the partnership between parties, which may short-circuit a variety of alternate applications on which the law is applicable. The SC shows the value of bright-line compliance. These types of rules also gain broad support from the tech community because of their computability and perceived effectiveness.[82]

[79] Liu, Y., & Huang, J. (2019). *supra nota 50*, p 3
[80] *Ibid*., p 25-26
[81] Levy, K. E. (2017). Book-smart, not street-smart: Blockchain-based Smart Contracts and the social workings of law. Engaging Science, *Technology, and Society*, 3, 10
[82] *Ibid*., p 10-11

Yet regulatory oversight remains in a grey state with SCs related to Blockchain technologies. A SC will be built on a legal basis by process regulations and relevant political, regulatory, and system-level agreements. While reflecting on the program itself, all parties must be aware of their respective statutory rights and responsibilities. Based to the assumption that the technology of Blockchain is being used as a digital exchange tool, no one person will be able to modify the SC, meaning that there will be no focused regulator capable of forcing adjustments in the agreement and delivery.[83]

[83] Liu, Y., & Huang, J. (2019). *supra nota 50*, p 2

CONCLUSION

The aim of this research paper was to investigate the current issues and advantages of SCs from the perspective of ADR. The problem of SCs was solved using different sources to seek possible answers for its gaps and benefits, based on a thorough exploration of ADR. It was determined that SCs need a more developed structure to maintain the normality of transactions and to contribute to the dialog on legal development options for automation. Hardly any case law exists to guide on any of the concerns that arise in the field of contracting and contract execution automation.

The current automation process of legal transactions keeps growing enormously, SC platforms might become more common especially in the financial sector, contract law principles, and SC principles are being challenged in some ways or others. A more editable SC code would allow a platform for dispute resolution as there would be an option to modify the contracts easier. Accepting a SC code is not indeed just about running and monitoring that no errors occur. Furthermore, there is no need to see that the net results are correct. Rather, it requires an understanding of the semantics of the agreement in order to obtain a lot of approval situations.

The thesis explained that although the modes of legal activity on Blockchain networks are getting more straightforward, the regulatory mechanisms are not. Contemporary development of legally permissible transactions is thus the production of a catalog of future contributions to the technology. Currently, you will find two ways to dispute resolution for SCs. SCs may function within the Contract Law framework, also may be settled by the courts or present DR processes. DR and contracts have been portrayed as the most vital legitimate difficulties presented by organizations due to the fact that contract formations and lay outs have remained, to a great extent, unaltered.

It may be brought about by arbitrary decisions of the regulatory bodies, or it may be brought about by judicial interference. Dispute resolution technology should be seen as the inclusive concept of ICT applications that encourage various conflict management aspects. Via legal and judicial portals, diagnostic tools, and chatbots these applications can allow access to general legal

assistance easily. Dispute resolution technology is a complex field, and different implementations frequently intersect, which makes it difficult to resolve distinctions between court appeals and legal software.

SCs can provide major contract changes when there is little ambiguity or where the process may otherwise be especially costly. Thus, businesses may enter into SCs in other parts of their businesses or manage a particular type of daily transactions. SCs could be made to be self-executing in the future, thus removing the need to turn into human interference. Currently, it is still important that the human involvement exists within this field. SCs usually utilize the highest degree of data encryption possible, rendering them thoroughly safe and stable, are being processed securely and backed up for years to come, meaning that they can be retrieved by contract-related counterparties anytime they need to, use knowledge to enhance and turn the operating cycle more effective, reduce the operating cost and need less personnel to handle the contracts, etc.

There is likely to be a need for human involvement in settling legal disputes, since multiple undisputed transactions involving SCs are likely to go ahead on the basis of an autonomous electronic compliance. Therefore, some of these compliance problems can limit the potential benefits of SCs. Although, SCs have their advantages and disadvantages, which might get a positive change during the upcoming years. This issue is sure to attract international attention and, at some point, this too has its place in legislation.

SCs may be utilized in both not so much controlled but rather more managed business areas, with a scope of automation from just insignificant perspectives to full automation of the whole contract. There is an expansive range of appropriateness for SCs and a correspondingly wide range of ways to deal with the structure, management, and execution of SCs.

Currently, you will find two ways to resolve disputes with SCs. The strategy requires SCs to be able to operate within the framework of contract law, and courts may also resolve them or submit alternative dispute resolution. Of course, dispute resolution can take several forms. This means only a final judgment in disagreements. This may be the result of arbitrary decisions by regulatory bodies or by a lack of legal action. However, the technical and ethical form of these conflict processes remains to be defined. Dispute resolution technology is a complex area, and different implementations are often intersecting, making it difficult to distinguish between court remedies and legal software.

It was found that the most serious issues of SCs are in the area of modification. The law includes certain reasons which 'forgive' the party for the performance or require certain types of changes. The topic is relatively new and will become more significant over time with the spread of automation. Digitalization is less advanced than automation, and precedes it. In conclusion, this topic clearly indicates that SCs need to be adjusted so that they could be easily modified in case of disputes or, otherwise, they won't work as persuasively as planned with their dispute management methods. It is going to be intriguing to observe the future of SCs and how they will be modified to satisfy the legal needs of the globalized world. It is clear that the research gaps could be filled in future researches and studies.

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