SMART CONTRACTS, ARTIFICIAL INTELLIGENCE AND CONSUMER PROTECTION[1]

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Summary

Although Smart Contracts are promising, they present some issues, such as those related to consumer relations. While some people defend that Smart Contracts could correct these relationships, others, on the other hand, point out the reduction of the protection of the more vulnerable parties, since consumers, effectively, barely interfere in the creation of the contract. In those cases, the use of Artificial Intelligence is discussed to ensure the flexibility and adaptation of the contract, providing greater legal certainty for the parties. Therefore, this work intends to discuss how the use of AI would be expressed in consumer Smart Contracts to help in the protection of the consumers.

Keywords

Smart Contracts, blockchain, consumer relations, artificial Intelligence.

I. INTRODUCTION

During the last few years, especially in the last two decades, digital innovations have become a more significant representation not only in daily life, but also in Law. In some way, technological transformations give rise to different uncertainties related to the most varied traditional legal aspects, such as a simple signature. Since the internet emerged, we have been completely absorbed by its use and – what used to be fear and uncertainty – is now a normal part of legal professionals' lives, *e.g.*, the use of emails to exchange important information[2]. Further examples of how the accelerated technological evolution influences Law are the electronic processes and digital contracting. The latter, though it has existed for a while, has been growing and evolving exponentially due to recent[3] events.

Smart Contracts were created in this context of Digitalization – which also provided the emergence of other technologies, like blockchain and Artificial Intelligence – and the increase of the use of electronic contracts. They receive this "Smart" denomination, but, in fact, they are not associated with any type of Artificial Intelligence (AI). Szabo adopted this expression because, at the time his concept was created, he was convinced that Smart Contracts were much more efficient than traditional contracts, since they did not require human intervention for their performance[4].

As a matter of fact, in theory, Smart Contracts could not be called "contracts", either, at least not with the meaning recognised by us, legal professionals[5]. This given that, in most cases, Smart Contracts are related to the execution of computer tasks that have no relation with the enforcement of obligations. Thus, we may say that Smart Contracts are digital instruments based on computer codes or protocols that facilitate the automatic enforcement of material orders, without the intervention of third parties, and could or could not perform the function of a contract[6].

A key tool, a huge influencer in the progress of Smart Contracts, is the DLT[7] (Distributed Ledger Technology) blockchain. Blockchain has a great impact and repercussion, since it stores transactions and information in a distributed and tendentially immutable way, that hinders the possibility of information fraud in the blockchain, providing security for the use of Smart Contracts and trust in the digital environment.

Along with the fact that blockchain brought the reliability that Smart Contracts needed for their good performance, it also brought many doubts and concerns, mainly related to its use in specific types of contractual relationships. The main issues associated with the use of Smart Contracts – most of them due to their self-executability and potential immutability – involve their use in legal agreements with vulnerable parties, as is the example of B2C (Business-to-Consumer) relations[8].

On the one hand, the optimists on the subject advocate that Smart Contracts could correct the disparities of these consumer relations and help consumers to guarantee their rights. On the other hand, there are those who argue that, indeed, there would not be a strengthening, but a reduction in the protection of vulnerable parties, since consumers effectively have limited interference in the creation of the contract and, moreover, do not have the necessary knowledge to influence the creation of Smart Contracts[9].

In an attempt to answer these and other debates involving the use of Smart Contracts, it is being analysed not only the use of accessory tools – *v.g.* the "oracles", but the use of Artificial Intelligence. In this sense, the intention is to assure the flexibility and adjustment of agreements performed through Smart Contracts and prevent unfair and opportunistic practices, providing legal certainty to the parties.

Therefore, this paper has the purpose to discuss how the use of Artificial Intelligence would be reflected in the consumer Smart Contracts and its consequences in Law, especially for the legal-consumer relations.

II. SMART CONTRACTS, BLOCKCHAIN TECHNOLOGY AND CONSUMER RELATIONS

1. Understanding Smart Contracts and the blockchain technology

The Smart Contracts were first[10] defined in the 90s by the lawyer and cryptographer Nick Szabo, defining that "A smart contract is a set of promises, specified in digital form, including protocols within which the parties perform on these promises" [11]. This set of promises operates according to an objective and conditional logic (if "this", then "that")[12], executed automatically, without the need of an intermediary for its drafting, negotiating and conclusion.

In summary, Smart Contracts are digital protocols that can perform the roles of contracts or any other type of computer task, in which the parties agree on their terms in advance and, automatically, once these requirements are met, their execution becomes effective. The great innovation in the Smart Contracts is the "trustless" system and its self-executability[13].

Szabo's first conception, which reminded us of vending machines[14], had the main objective of correcting the weaknesses of conventional contracts, since he considered the latter to be inefficient and extremely costly. However, for all their potential effectiveness to be used, an advanced technological environment was required to enable their use and to store the information securely.

In 2008, when the crypto-asset Bitcoin and the blockchain technology arose – whose creation was attributed to the pseudonym Satoshi Nakamoto[15], but even today it involves a mystery about who and how many people were behind its creation – an opportunity was seen for the improvement and development of Smart Contracts. This being so, the blockchain technology, due to its characteristics of potential immutability and decentralisation, provides more effectiveness and reduces costs in the process of formation and execution of contracts and computer tasks, facilitating the enforcement of obligations and (or) transactions, with a safe and transparent system for the storage of information[16].

Blockchain technology is defined as a technology for registration of information that is based on peer-to-peer[17] and distributed consensus. The name "blockchain" is used due to its functioning system, which works through overlapping blocks – the next block will always have the information from the previous one – forming its own fingerprint. This performance mode means that transactions are validated at the same time in several places/devices and nowhere, preventing the introduction of false or fraudulent information into the chain.

In this way, although it has been created to improve the Financial System[18], it also works as an operational and practical force of the Smart Contracts, receiving the Smart Contract previously codified, written, and programmed, publishing and expanding that information through the network[19].

2. The use of Smart Contracts in consumer relations

Indeed, blockchain technology and Smart Contracts were created at different times and with different objectives. However, blockchain has an essential role for the use of Smart Contracts, especially in contractual relations. The big question, nevertheless, is that being one of the main objectives of Contract Law to protect the fragile parties[20], to guarantee liberty and balance between individuals – both party and counterparty – and to promote contractual justice[21], how to provide these objectives in Smart Contracts based on blockchain? Moreover, we cannot forget the duty of information, duty of diligence, among other duties that cannot be based on the terms purely written in the cryptographed code.

The liberty of contracting requires consideration and knowledge, mainly in the conclusion of consumer contracts, at a time when technological advances and the open markets offer the consumer a diversity of goods and services characterized by supply and demand, together with increasingly complex information[22]. This situation puts the consumer in a weak position, since companies will have superior knowledge of what is being sold or provided, while the consumer may have little – or no – knowledge.

Therefore, Consumer Law is designed to protect and support consumers against possible unfair situations of a diverse nature, which affect the interests of the parties and may result from an asymmetry of knowledge, tools and power between consumers and businesses in the context of market transactions[23]. In the European Union, for example, the Article 169[24] of the Treaty on the Functioning of the European Union identifies consumers as vulnerable parties in consumer relations, demonstrating the commitment to guarantee their protection.

Regarding the application of Smart Contracts[25] in B2C relations, for the business parties[26], the "reduced costs, simplified enforcement procedures and faster supervision of contract performance"[27] seem certainly beneficial and attractive. The controversy exists, however, relatively to consumer protection, i.e., if the use of Smart Contracts reinforces or undermines the protection of consumers.

III. THE CONSUMER PROTECTION IN SMART CONTRACTS

About the protection of consumers in the use of Smart Contracts we clearly notice a division of two groups: those who argue that Smart Contracts strengthen the protection of these parties considered more vulnerable and those who advocate that there would be, in fact, an obstacle to this protection.

The first group, formed by the ones who believe in the enhancement of consumer protection using Smart Contracts, is based on the idea that consumers would have new resources in online bargaining, correcting the existing disparities between the parties in B2C relations, thus restoring the information imbalance[28]. According to Eduardo Tatit[29], Smart Contracts enable consumers to establish their own contracting conditions, without the intervention of a trustable third party[30]. The Smart Contracts connect these consumers directly to sellers who are in accordance with the predetermined requirements, i.e., the contract would only be made when those conditions are satisfied[31]. In addition, they also see Smart Contracts as instruments to assist in the direct enforcement of consumer rights, when consumers are injured by a breach (total or partial) in the contract by the company or entity contracted[32]. In this sense, Bernardo Moraes and Gustavo Mello defend the effectiveness of Smart Contracts in contractual relations, since “the verification, execution and entry into force of the terms of the bilateral legal business – contract – are automatic, while ensuring its stability (because it cannot be revoked), as well as its transparency and publicity”[33].

By contrast, there are the voices of those who believe that all this “pro-consumer” potential is not true at all. Firstly, because consumers effectively have minimal influence over the creation of the Smart Contract, enabling powerful parties – businesses, traders, etc. – to take advantage at the consumer's expense[34]. Moreover, even if consumers had the power of decision, in most cases, they do not even have the required knowledge and expertise to influence the construction of Smart Contracts[35]. Taking, for example, the standard-form contracts via Smart Contracts, companies could take advantage and benefit from the generally low motivational level of consumers to file a lawsuit to insert unfair terms[36] within these contracts. Given that businesses parties can enforce – through a unilateral decision – quite easily any factual legal consequence on the counterparty simply by creating or issuing automated decisions, the use of Smart Contracts could come to encourage this type of practice. Consequently, the use of Smart Contracts in this kind of contractual relations would also difficult the justice and protection of the parties. It is important to emphasize that, over the years, the European Union has been making a movement precisely to protect consumers from these abusive practices, generally present in standard-form contracts[37]. In fact, looking at the Article 8b of Directive 2019/2161 amending Council Directive 93/13 and Directives 98/6, 2005/29 and 2011/83 of the European Parliament and of the Council on the better enforcement and modernization of Union consumer protection rules, we verify tougher sanctions, which support the idea of combating this type of clause.

Therefore, considering these two positions, we understand that, depending on the specific case, there may be, in fact, the unprotection of the average consumer in relation to the trader. For the Law professionals achieving contractual justice is often a difficult task, let alone for a computer code that – in opposition to us, human beings – cannot, by itself, generate solutions or even make decisions that take into consideration aspects that were initially unpredictable or difficult to clearly define[38].

The objective language, added to the potential immutability and self-executing nature of Smart Contracts may bring, consequently, disadvantages to consumers. However, the automation present in Smart Contracts, if in compliance with the legislation, may help this process of consumer protection, automatically applying the consequences for the breach of a certain clause or disrespect to some principle, for example.

When it comes to consumer protection, Geraint Howells, Christian Twigg-Flesner and Chris Willett[39], bring an interesting reflection: on the one hand, the legal rules must adapt to new technological and market conditions, considering the risks and vulnerability of consumers, which may be emphasized by the use of these new technologies; on the other hand, a strongly protective regulation may undermine the development of these innovations. In essence, they reflect that consumer protection should be more focused on the values – contexts behind the level of protection – than purely on the existing law, so that there is a balance between consumer protection and technological developments.

1. The use of "oracles" in Smart Contracts for the consumer protection

It is true, as previously mentioned, that Smart Contracts and the blockchain provide a "trustless" environment, i.e., there is no need for human intervention for its execution. However, blockchain is only able to verify if a predetermined task has been performed or not, and cannot get external factors, which depend on a human interpretation and an analysis of elements that do not belong to the contract but are essential for its proper functioning. This is not to say that Smart Contracts should not be applied at all in consumer relations, because, visibly, they have their advantages. It must be associated with elements that provide the protection of the weaker parties – consumers – so that they are not harmed, though.

Bearing in mind that the revocable reasoning and the dialectical argument are important in contractual and consumer relations, the integration of the so-called "oracles"[40] becomes fundamental to optimize the quality of operation of Smart Contracts in consumer contracts. The "oracles" are third-party companies that connect the offline world with the online world, i.e., these companies collect external information and bring it into the blockchain to be validated and inserted into that specific contract. They work as a bridge between the Smart Contracts code and the external structure of any content/information[41]. These "oracles" can be decentralized[42], which makes the system more secure and impartial, having a "relevant role to prevent abuse of rights and ensure legal certainty" [43].

In the case of rail passengers' compensation[44], provided for in Regulation 1371/2007, for example, the "oracle" would transmit the necessary information to the blockchain, and, in case of delay, the Smart Contract would automatically apply the corresponding compensation[45]. In this context, the data received through the "oracles" would improve the functioning of the

Smart Contract, which would obtain more accurate and reliable information, supporting both parties to the contract.

It should be noted that, as blockchain technology, *per se*, does not allow the transaction to be reversed or stopped once executed, the presence of an "oracle" is important to allow it to be contested, in compliance with the relevant legislation, or with the updated status of that particular contract[46]. This could hardly happen if there was no connection between the Smart Contract and the outside world.

The first big issue for the inclusion of "oracles", however, is the intervention – in a way, human – of third parties. By the way, this is one of the main features of Smart Contracts, which differs them from all other means of electronic contracting and, at the same time, attracts many users.

Another important point to consider is that, when we discuss numerical elements events, this task seems easy to be performed by the "oracles" and correctly included within the Smart Contracts. Still, in cases where the contents must precede interpretation, or are related to expressions that refer to general clauses or generic legal concepts, it seems to be more difficult[47].

Furthermore, the use of the "oracle", although it seems to us to be the best alternative to enhance the use of Smart Contracts and safeguard the consumer, is not completely infallible and its legal consequences are not yet clearly defined[48].

2. The application of Artificial Intelligence for the improvement of Smart Contracts in consumer relations

Responding to concerns about the use of Smart Contracts not only in consumer relations, but in contractual relations in general, a possible solution would be the creation of "oracles" based on Artificial Intelligence, increasing the efficiency of the information obtained and, consequently, reducing the costs. As Gabriele Mazzini declares, AI is recognized as a technology with the potential to bring great transformative economic and social effects, which need to be harnessed for the benefits of people and society, according to the European approach[49].

The use of "oracles" based on AI, due to the great capacity of collecting data in a short space of time, would serve to express and simulate legal reasoning, being able to evaluate fundamental notions of contract and consumer law by inserting these nuances into Smart Contracts. The use of Artificial Intelligence would not only help in a quantitative analysis of information, but it would also help in the application of Law in issues that require human interpretation of natural or legal contents[50]. At the same time, it would permit the code to approach the reality of the contractual parties and the possible unpredictable changes more accurately.

However, we cannot forget that the use of Artificial Intelligence in transactions between companies and consumers must be fair, transparent, and compatible with Consumer Law. The lack of an adequate legal framework keeps the concern around the use of these technologies, since the possible negative impacts of abuse in Smart Contracts become more evident, especially in B2C relations[51].

The issue of the application of AI, though, is still very uncertain and we do not know its effects on Smart Contracts and whether the creation of specific legislation, in this aspect, would not make sense to safeguard the protection of the most vulnerable parties. Furthermore, in case of failure of the “oracles”, the legal consequences are not yet expressly established. In the same way, adding Artificial Intelligence to Smart Contracts to protect the consumer is interesting, but it brings other issues related to technology, which deserve special attention.

At the current point in which the development of Artificial Intelligence in the “oracles” is, even though technology is important to get external information essential for the development of the Smart Contract, the difficulty of understanding the ambiguous terms may remain, keeping the problem of interpretation. If there is this interpretative deficiency, would it consequently affect the correct execution of the contract? And, if so, who would be responsible for this error?

It does not mean, at all, that the use of Artificial Intelligence and Smart Contracts should be excluded from consumer relations. However, it is necessary to find – or try to promote – a balance between the parts of this relationship that are usually in asymmetric situations. Thus, before the application of these technologies, it is necessary to devise strategies that guarantee the execution of the contractual terms in an automated way and take advantage of their full potential, without disrespecting consumer laws and preserving the logic that involves the creation of laws[52].

IV. CONCLUSIONS

Smart Contracts are presented as a contractual technological innovation that significantly modifies the way of contracting and, above all, the way of executing consumer agreements/contracts. The characteristics of Smart Contracts reduce the need for a third party, both to manage the business terms and to resolve possible conflicts between the parties, which facilitates contracting and, potentially, reduces the costs of transactions carried out this way.

It is currently observed that consumers have more and more rights; however, it does not mean any guarantee of enforcement of them. Mainly about consumer protection, there is, in fact, a discrepancy between having these rights and applying, since most consumers are not even aware of them and, even if they do, they often prefer not to do anything about. In other words, a more educated minority of consumers claims their rights, which, consequently, harms even more the others who remain inert, since there is a price dynamic on the part of the companies to insert in the amounts charged the payment of the small part of the population that postulates its enforcement[53].

It remains evident that, due to the automatic execution of Smart Contracts, they can be highly advantageous and potentially applicable in various fields. Despite criticism of this technology, mainly because of its rigidity and automaticity, in the long term and during its development and study, the tendency is that it can be more easily – and on a larger scale – applied for the benefit of Consumer Law. However, there are a few challenges to be confronted to establish Smart Contracts as a reliable mechanism for enforcing these rights.

The use of "oracles", undoubtedly, can answer some questions related to consumer protection in the context of Smart Contracts, in spite of its limitations. Artificial Intelligence, too, can help in the process of interpreting and simulating human reasoning, but to what extent and in what way this could occur without generating new legal questions – perhaps, without a solution. Furthermore, if there is a need for support from specific regulations, what would be the limit for creating new laws for intervention under new technologies so as not to prevent their development?

Regardless of which position you take in relation to the use of Smart Contracts in consumer contracts, what is certain is that, increasingly, the paper-based economy is moving towards the digital world. Therefore, instead of trying to stop technological evolution, it is necessary to understand to what extent technological creativity and new forms of communication – as in the case of Smart Contracts – are revealed in the legal field to safeguard a balance between the interests of the parties in the consumer relations and the protection of their rights.

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[2] M. S. VÍTOR, Inteligência Artificial e Contratos", *Inteligência Artificial & Direito*, M. L. ROCHA; R. S. PEREIRA (coord.), Coimbra, Almedina, 2020, pp. 222-223.

[3] Here we refer to the pandemic of COVID-19. In fact, even before the pandemic situation, the influence of technology in our *modus vivendi* was already being noted, but, undoubtedly, in the last two years we have seen the importance of technology in everything, from the simplest tasks to the most complex ones in an electronic environment. Therefore, the use of technology is no longer questionable, what is being discussed is the best way to apply it and take advantage of its use on society's behalf.

[4] R. UNSWORTH, "Smart Contract This! An Assessment of the Contractual Landscape and the Herculean Challenges it Currently Presents for "Self-executing" Contracts", *Legal Tech, Smart Contracts and Blockchain*, M. CORRALES; M. FENWICK; H. HAAPIO, Singapore, Springer, 2019, pp. 19-20.

[5] Cf. F. DE ARAUJO MEIRELLES MAGALHÃES, "Os Smart Contracts e o papel dos tribunais em matéria de Direito dos Contratos", *Estudos Jurídicos Sobre Inteligência Artificial e Tecnologias*, F. VEIGA; C. CEBOLA; S. MONTEIRO (Coords.), Porto, IBEROJUR, 2022, pp. 146 e ss. M. VÍTOR, Inteligência Artificial e Contratos", *Inteligência Artificial & Direito*, M. ROCHA; R. PEREIRA, Coimbra, Almedina, 2020, pp. 225 e ss.

[6] J.W. IBÁÑEZ JIMÉNEZ, *Derecho de Blockchain y de la Tecnología de Registros*, Cizur Menor (Navarra), Aranzadi, 2018 p. 96.

[7] Distributed ledger technologies are a kind of digital, distributed transaction ledger that stores blocks of data shared across a network of computer nodes. P. LAURENT; S. HURTAUD; T. CHOLLET; S. GENCO, "Distributed Ledger Technologies services: using the power of blockchain", *Deloitte*, 2017, pp. 1-8. Available in *https://www2.deloitte.com/lu/en/pages/technology/solutions/blockchain-distributed-ledger-technology-stitch-in-time.html* (15.01.2022)

[8] In this context, see S. WRBKA, Stefan, "A Multilayer Safeguard Mechanism to Optimise the Potential of Smart Contracts in B2C Transactions", *Smart Contracts – Technological, Business and Legal Perspectives,* M. COMPAGNUCCI; M. FENWICK; S. WRBKA, Oxford, Hard Publishing, 2021, pp. 123-144.

[9] S. WRBKA, "A Multilayer Safeguard Mechanism to Optimise the Potential of Smart Contracts in B2C Transactions", *Legal Tech, Smart Contracts and Blockchain,* M. CORRALES; M. FENWICK; H. HAAPIO, Singapore, Springer, 2019, pp. 123-124.

[10] We say the first concept, because Smart Contracts were conceptualised years later by the creator of the Ethereum platform, Vitalik Buterin. The difference between Buterin's concept and Szabo's original concept is that the more recent concept refers to Smart Contracts created and used within the Ethereum platform, through DLTs, more specifically, the blockchain. The Ethereum Project was launched by Vitalik Buterin in 2015, in a context where blockchain technology already existed. V. BUTERIN, "A next generation smart contract & decentralized application platform", Ethereum White Paper, 2014. Available in *https://github.com/ethereum/wiki/wiki/White-Paper#decentralized-autonomous-organizations* (23.05.2021).

[11] N. SZABO, Smart Contracts: Building Blocks for Digital Markets, 1996. *Available in http://www.truevaluemetrics.org/DBpdfs/BlockChain/Nick-Szabo-Smart-Contracts-Building-Blocks-for-Digital-Markets-1996-14591.pdf* (12.02.2019).

[12] M. A GÓMEZ, "(In)fallible Smart Legal Contracts*", in Legal challenges in the New Digital Age*, A. M. LOPEZ RODRIGUEZ; M. D. GREEN; M. LUBOMIRA KUBICA, Leiden, Koninklijke Brill, 2021, p. 29-30.

[13] A. A. BECERRIL GIL; S. ORTIGOZA LIMÓN, "Habilitadores tecnológicos y realidades del derecho informático empresarial", *Revista del instituto de Ciencias jurídicas de Puebla*, vol. 12, nº. 41, México, Nueva Época, 2018, p.29.

[14] Vending machine: "a machine from which you can buy small things such as cigarettes, drinks, and sweets by putting coins into it". Available in *https://dictionary.cambridge.org/pt/dicionario/ingles/vending-machine* (13.06.2020)

[15] S. NAKAMOTO, "Bitcoin: A Peer-to-Peer Electronic Cash System", Bitcoin, 2008.

[16] F. DE ARAUJO MEIRELLES MAGALHÃES, "'Smart Contracts': o paradigma entre a imutabilidade e a necessidade de flexibilização contratual em tempos de crise", *Actualidad Jurídica Iberoamericana*, n.º 16, febrero 2022, pp. 1254-1269.

[17] "Peer-to-peer systems are distributed systems consisting of interconnected nodes able to self-organise into network topologies with the purpose of sharing resources such as content, CPU cycles, storage and bandwidth, capable of adapting to failures and accommodating transient populations of nodes while maintaining acceptable connectivity and performance, without requiring the intermediation or support of a global centralized server or authority". S. ANDROUTSELLIS-THEOTOKIS; D. SPINELLIS, "A Survey of Peer-to-Peer Content Distribution Technologies", *Athens University of Economics and Business*, 2004, p. 337.

[18] The European Central Bank even recognizes blockchain technology as a financial transformational force, having its president highlight its adoption to improve the efficiency of banking and market services. I. SÁNCHEZ RUÍZ DE VALDIVIA, "Blockchain y plataformas de financiación participativa: dos retos del mercado único digital", *in Relaciones contractuales en la economía colaborativa y en la sociedad digital*, G. GARCÍA GONZÁLEZ; M. R. GOMES REDINHA; M. R. GUIMARÃES; B. SÁENZ DE JUBERA HIGUERO, Beatriz, Madrid, Editorial Dykinson, 2019, pp. 353-373.

[19] J. W. IBÁÑEZ JIMÉNEZ, *Derecho de Blockchain y de la Tecnología de Registros*, Cizur Menor (Navarra), Aranzadi, 2018.

[20] *E.g.* consumer relations, where the consumer, in general, is weaker compared to large companies both at the informational and economic level.

[21] F. DE ARAUJO MEIRELLES MAGALHÃES, "Os Smart Contracts e o papel dos tribunais em matéria de Direito dos Contratos", *in Estudos Jurídicos Sobre Inteligência Artificial e Tecnologias*, F. DA SILVA VEIGA; C. MARQUES CEBOLA; S. SARDINHA MONTEIRO, Porto, IBEROJUR, 2022, pp. 143-156.

[22] L. M. SIMÃO DA SILVA CALDAS, "Direito à informação no âmbito do direito do consumo: o caso específico das cláusulas contratuais gerais", *in Julgar*, n.º 21, 2013, p. 204. Available in *http://julgar.pt/wp-content/uploads/2013/09/11-Silva-Caldas-Direito-%C3%A0-informa%C3%A7%C3%A3o-direito-do-consumo.pdf* (15.07.2022)

[23] G. MAZZINI, "A System of Governance for Artificial Intelligence through the Lens of Emerging Intersections between AI and EU Law", *in Digital Revolution: New Challenges for law*, A. DE FRANCESCHI; R. SCHULZE, Germany, Verlag C.H. Beck/Nomos, 2019, p. 267.

[24] Article 169

1. In order to promote the interests of consumers and to ensure a high level of consumer protection, the Union shall contribute to protecting the health, safety and economic interests of consumers, as well as to promoting their right to information, education and to organise themselves in order to safeguard their interests.

2. The Union shall contribute to the attainment of the objectives referred to in paragraph 1 through:

(a) measures adopted pursuant to Article 114 in the context of the completion of the internal market;

(b) measures which support, supplement and monitor the policy pursued by the Member States.

3. The European Parliament and the Council, acting in accordance with the ordinary legislative procedure and after consulting the Economic and Social Committee, shall adopt the measures referred to in paragraph 2(b).

4. Measures adopted pursuant to paragraph 3 shall not prevent any Member State from maintaining or introducing more stringent protective measures. Such measures must be compatible with the Treaties. The Commission shall be notified of them.

[25] From now on, when we use the term Smart Contracts, we are referring to Decentralized Smart Contracts, or in other words, Smart Contracts based on blockchain technology.

[26] Producers, suppliers or traders.

[27] S. WRBKA, "A Multilayer Safeguard" cit., p. 127.

[28] R. PARDOLESI; A. DAVOLA, "Smart Contract: Lusinghe ed equivoci dell'innovazione purchessia", *Liber Amicorum – Guido Alpa*, Francesco Capriglione, Milano, Wolters Kluwer, Padova, Cedam, 2019, p. 306.

[29] E. MACEDO LEME TATIT, *Smart Contracts: A evolução dos contratos tradicionais*, 2018. Available in *https://www.linkedin.com/pulse/smart-contracts-evolu%C3%A7%C3%A3o-dos-contratos-tradicionais-eduardo/* (17.08.2019).

[30] In this sense, see M. RUDANKO, "Smart Contracts and Traditional Contracts: Views of Contract Law", *Legal Tech, Smart Contracts and Blockchain*, M. CORRALES; M. FENWICK; H. HAAPIO, Singapore, Springer, 2019, pp. 59-78.

[31] E. MACEDO LEME TATIT, *Smart Contracts: A evolução dos contratos tradicionais*, 2018. Available in *https://www.linkedin.com/pulse/smart-contracts-evolu%C3%A7%C3%A3o-dos-contratos-tradicionais-eduardo/* (17.08.2019).

[32] In this context, let us use Article 17 of Regulation (EC) No 1371/2007, which is about rail passengers' compensation for delays from the railway. The minimum compensations are equivalent to 25% of the ticket price for a delay of 60 to 119 minutes and a 50% of the ticket price for delay of two hours or more. In case of contracting through Smart Contracts there would not be the problem of railroad companies not making the payment voluntarily or trying to hinder the consumer's right by imposing several bureaucratic procedures, as these rights would be automatically guaranteed by the contract, facilitating consumer protection.

[33] Our translation. B. BISSOTO QUEIROZ DE MORAES; G. MARCHI DE SOUZA MELLO, "Smart legal contracts carregam consigo incontáveis benefícios", *Revista Eletrônica Consultor Jurídico*. Available in *https://www.conjur.com.br/2018-out-29/smart-legal-contracts-contratos* (15.08.2019)

[34] M. RUDANKO, "Smart Contracts" cit., p. 75.

[35] S. WRBKA, “A Multilayer Safeguard” cit., p. 124.

[36] In Portuguese legislation: DL nr. 446/85 - Standard Contractual Clauses.

[37] In this context, thanks to Directive 93/13/EEC (Unfair Contract Terms Directive) protection against unfair contract terms has common minimum standards throughout the EU. The objectives of the UCDT, are based on “idea […] that the consumer is in a weak position vis-à-vis the seller or supplier, as regards both his bargaining power and his level of knowledge, which leads to the consumer agreeing to terms drawn up in advance by the seller or supplier without being able to influence the content of those terms[…].”. COMMISSION NOTICE, “Guidance on the interpretation and application of Council Directive 93/13/EEC on unfair terms in consumer contracts”, *in Official Journal of the European Union*, 2019. Available in *https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52019XC0927%2801%29* (15.07.2022).

[38] S. WRBKA, “A Multilayer Safeguard” cit., p. 133.

[39] G. HOWELLS; C. TWIGG-FLESNER; C. WILLETT, “Protecting the Values of the Consumer Law in the Digital Economy: The case of 3D-printing”, *Digital Revolution: New Challenges for law*, A. DE FRANCESCHI; R. SCHULZE, Verlag C.H. Beck/Nomos, Germany, 2019, pp. 215 e ss.

[40] C. TUR FAÚNDEZ, *Smart contracts: análisis jurídico*, Colección de derecho de las nuevas tecnologías, Madrid, Reus Editorial, 2018, p. 111-115.

[41] R. H. WEBER, “Smart Contracts: Do we need New Legal Rules?”, *in Digital Revolution: New Challenges for law*, A. DE FRANCESCHI; R. SCHULZE, Germany, Verlag C.H. Beck/Nomos, 2019, pp. 308-309.

[42] On this point, as stated by André Feiteiro (and we agree), the character of centralization in a single oracle is presented as a point of failure, since it goes against the whole idea behind Smart Contracts. A. FEITEIRO, “The Complementary but not Alternative Utility of Smart Contracts”, *in Revista de Direito e Tecnologia*, Vol. 2, 2020, disponível em *https://blook.pt/publications/publication/24df53083858/* (23.02.2021).

[43] Our translation. F. DE ARAUJO MEIRELLES MAGALHÃES, “‘Smart Contracts’ cit., p. 1263.

[44] See footnote 32.

[45] In this aspect, see *https://etherisc.com/*

[46] R. H. WEBER, “Smart Contracts” cit., p. 307.

[47] F. S. DI S. IPPOLITO; M. NICOTRA, *Diritto della blockchain, Inteliligenza Artificiale e IoT*, Milano, Wolters Kluwer, 2018, p. 105.

[48] R. H. WEBER, “Smart Contracts” cit., p. 309.

[49] G. MAZZINI, “A System” cit., p. 245.

[50] M. RUDANKO, “Smart Contracts” cit., p. 73.

[51] S. WRBKA, “A Multilayer Safeguard” cit., pp. 143-144.

[52] S. WRBKA, “A Multilayer Safeguard” cit., loc. cit.

[53] M. FRIES, *Law and Autonomous Systems Series: Smart consumer contracts - The end of civil procedure?*, 2018.