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REBUS SIC STANTIBUS IN THE AGE OF ARTIFICIAL INTELLIGENCE: THE VITAL ROLE OF JUDICIAL DISCRETION IN CONTRACTUAL JUSTICE

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Abstract: *This article investigates how the principle of contractual justice - an unwritten yet fundamental source of private law - continues to operate in an era shaped by artificial intelligence (AI). Although pacta sunt servanda remains the cornerstone of contractual certainty, the doctrine of rebus sic stantibus functions as a corrective when radically changed circumstances would make strict performance inequitable. Recognised across all developed legal orders and recently codified in many, the authors analyse the doctrine in more than twenty European jurisdictions, with attention to convergences and doctrinal divergences. The study then turns to smart-contract technology and AI-driven automation, asking whether code-based execution can accommodate contractual justice or instead amplifies contractual rigidity. The authors conclude that automated decision-making can handle only quantifiable adjustments, whereas genuine fairness still requires case-sensitive judicial discretion grounded in unwritten principles. Even - and especially - in the age of AI, therefore, courts - and the normative resources of good faith, fairness and equity - remain indispensable safeguards of contractual balance.*

Key words: *Changed Circumstances; Rebus Sic Stantibus; Unwritten Law; Principle of Contractual Justice; Intelligent Contracts; Artificial Intelligence; Judicial Discretion; Contract Law*

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1. INTRODUCTION

Historically, contract law is fundamentally anchored in the principle of *pacta sunt servanda*; yet strict adherence to the original agreement may be unjustified where it conflicts with principles of equivalence, good faith, honesty, and justice. When the nature of contractual performance changes substantially after the contract's conclusion, maintaining the original terms may become inequitable. Consequently, under the principle of contractual justice, the contract must be modified or terminated. This concept is known as the doctrine of *rebus sic stantibus*, recognised across all developed legal systems, albeit with varying approaches and terminologies.[1] Originally rooted in

[1] Different terms are used across legal systems to describe the impact of changed circumstances: *Störung der Geschäftsgrundlage* (Germany, § 313, Bürgerliches Gesetzbuch), *Wegfall der Geschäftsgrundlage* (The concept is not expressly codified in the Austrian Civil Code - Allgemeines Bürgerliches Gesetzbuch, ABGB, but has instead developed through judicial decisions and scholarly literature (Bollenberger in Koziol, Bydlinski and Bollenberger, 2007, p. 881), *spremenjene okoliščine* (Slovenia, Art. 112, Obligacijski zakonik), *promijenjene okolnosti* (Croatia Art. 369, Zakon o obveznim odnosima), *promenjene okolnosti* (Serbia, Art. 133, *Закон о*

principles such as equivalence, good faith, honesty, and justice, the doctrine evolved through judicial practice and has recently been increasingly codified into statutory law.[2] Its historical relevance has fluctuated, aptly captured by Bernhard Windscheid's remark: "*If you throw it out the door, it will always come back through the window*."[3] This observation has proven particularly true in recent years. Although the doctrine was nearly forgotten at the beginning of the 21st century, the COVID-19 pandemic of 2020 triggered a global revival, soon followed by additional major disruptions, including surging material prices, energy costs increasing by several hundred percent, the full-scale invasion of Ukraine by the neighbouring country, Russia, high inflation, and the ongoing risk of a global trade war.[4]

Rapid technological advances over the past three decades have profoundly reshaped numerous economic sectors, and technological innovation increasingly influences contract law. In 2017, a real revolution anticipated, when blockchain technology gained widespread recognition. Providers of decentralised platforms highlighted the utility of so-called smart contracts, emphasising that performance no longer depended on the will of the parties but solely on the fulfilment of predefined conditions, given that smart contracts operate exclusively through pre-programmed code. Enthusiastic proponents even predicted the complete replacement of traditional contract law within a few years (Mik, 2017, p. 269); however, these expectations quickly proved exaggerated. More recently, growing attention has been devoted to integrating artificial intelligence (AI) models with blockchain technology, giving rise to the concept of Blockchain Intelligence (Li, Qin, Guan, Hou and Wang, 2024, p. 6634; Zheng and Dai, 2019; Zheng, Dai and Wu, 2021, p. 2). The incorporation of AI into smart contracts could enable automated task execution via machine learning, thereby enhancing their adaptability to changes in the business environment (Ouyang, Zhang and Wang, 2022, p. 1). This development inevitably raises the question of whether the role of the principle of contractual justice, as an unwritten source of contemporary contract law, is undergoing a transformation in the age of artificial intelligence.

The primary aim of this article is to critically examine how the principle of contractual justice, as one of the most significant unwritten sources of contract law, continues to maintain its role in contemporary legal systems. Drawing on a comparative

облигационим односима), *zmena pomerov* (Slovakia, Art. 356, Obchodný Zákonník), *změny okolností* (Czech Republic, Art. 1764, Občanský zákoník) *imprévision* (France, Art. 1195, Code Civil), *eccessiva onerosità sopravvenuta* (Italy, Art. 1467, Codice Civile), *alteración sobrevenida de las circunstancias* (Spain, the term originates from the proposed regulation, which has not yet been adopted, see Propuesta de modernización del Código Civil en materia de obligaciones y contratos, Ministerio de Justicia, Madrid, 2023, pp. 104-5), *frustration of purpose* (English law, Krell v. Henry), *hardship* (Arts. 6.2.1, 6.2.2, 6.2.3, Principles of International Commercial Contracts – PICC) and *changed circumstances* (Art. 6:111, Principles of European Contract Law – PECL).

[2] The doctrine was codified in Germany in 2002 (Rösler, 2007, p. 490), in the Czech Republic and Hungary in 2014 (Zákon č. 89/2012 Sb., Občanský zákoník; 2013. évi V. törvény a Polgári Törvénykönyvről), in France in 2016 (Pédamon, 2017), and in Belgium in 2023 (à loi du 28 avril 2022 portant le Livre V « Les obligations »); its regulation has also been announced in Spain (Propuesta de modernización del Código Civil en materia de obligaciones y contratos, Ministerio de Justicia, Madrid, 2023, pp. 104-105).

[3] »*Wirf ihn durch die Tür, er wird immer wieder durch das Fenster hereinkommen*.« ["Throw it out the door, and it will always come back through the window."], Die Voraussetzung, 1892, 78, Archiv für die civilistische Praxis 197 (Zimmermann, 1996, p. 581).

[4] In April 2025, U.S. President Donald Trump introduced a general 10-percent global tariff on all countries on all imported goods into the United States and special "reciprocal" tariffs targeting 57 countries, which will be subject to increased reciprocal tariffs (instead of the 10-percent global tariff. Specifically for the EU, "reciprocal" tariffs include a 20-percent tariff on all imported goods and a 25-percent tariff on imported cars, steel, and aluminum (The White House, Available at: https://shorturl.at/wJTzGhttps://www.whitehouse.gov/ (accessed on 2.4.2025).

analysis of the doctrine of *rebus sic stantibus* across more than twenty European jurisdictions, the authors explore the issue of equitable contractual adjustment in cases of changed circumstances and assess the challenges posed by automated decision-making processes and AI regarding smart contract adaptability. The research hypothesis advanced in this article is that the automated nature and algorithmic rigidity of smart contracts present challenges to justice and flexibility in contract law, underscoring the need - especially in the era of AI - to preserve judicial discretion and unwritten legal principles as essential corrective mechanisms for ensuring contractual fairness.

Methodologically, this article is positioned at the intersection of legal theory, contract law, and information technology. The research employs various scientific methods selected according to the specifics of the research problem and objectives. The descriptive method is used to define key research concepts, occasionally supported by the historical method for better contextual understanding. The comparative dimension is grounded in comparative law theory. The relevance of the principle of contractual justice in contemporary legal systems is examined using analytical, synthetic, inductive, and deductive methods. The study is structured into three thematic sections: (1) The Principle of Contractual Justice and the Doctrine of *Rebus Sic Stantibus*; (2) Smart Contracts and Artificial Intelligence; and (3) The Role of the Principle of Contractual Justice in the Context of Artificial Intelligence. The conclusion presents findings related to the research hypothesis.

2. THE PRINCIPLE OF CONTRACTUAL JUSTICE AND THE DOCTRINE OF *REBUS SIC STANTIBUS*

Although codified law has been the hallmark of continental legal systems, a broad range of unwritten sources - including trade customs, industry practices, usages, practices established between parties, unwritten agreements, unwritten principles, and business ethics - have played a vital role in contract law (Hellwege, 2014, p. 887; Oestmann, 2002, p. 409; Sachse, 1927, p. 290; Dedek, 2013, p. 9). Grounded in morality and customs, these sources are significant both in the creation and interpretation of positive law (Drnovšek, 2015, pp. 816-831). The principle of contractual justice, understood as a specific expression of broader concepts of justice, becomes crucial where rigid application of codified rules would lead to unfair outcomes. Legal theory conceptualises justice in contract law variously: some scholars emphasise relational justice (Dagan and Dorfman, 2021, pp. 4-5), proposing it as a new paradigm incorporating classical doctrines like the *rebus sic stantibus clause* into a broader concept of contractual justice (Caro Gándara, 2022, p. 275; Gordley, Jiang and von Mehren, 2021, p. 249; Campbell, Collins and Wightman, 2003, pp. 22–24). Others, in a similar vein, highlight justice achieved by focusing on the unique circumstances of individual cases (*Einzelfallgerechtigkeit*) - a more precise form compared to contractual justice, which ensures fairness within the contractual framework (*Vertragsgerechtigkeit*; Ince, 2015, pp. 73-75). As Dagan and Dorfman (2021, p. 5) explain, contractual justice is best seen as a form of relational justice, rooted in reciprocal respect for self-determination and substantive equality. Across legal systems, fairness is addressed differently: in German law, the general clause of good faith and fair dealing (*Treu und Glauben* in § 242 BGB) already operates as a corrective mechanism for abusive conduct or imbalance, supplemented by the specific rule on the collapse of the basis of the transaction (*Störung*

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der Geschäftsgrundlage, § 313 BGB).[5] Austrian law permits annulment of contracts violating public morals under § 879 ABGB.[6] In Slovenia, Article 112 of the Obligations Code[7] enables courts to terminate (but not adapt) contracts when radically changed circumstances make their performance contrary to generally accepted standards of fairness (*pravičnost*). As Ronald Dworkin observed, moral principles - such as fairness, good faith, and equity - are essential for resolving hard cases where outcomes cannot be determined solely by legal rules (Post, 1991, p. 45).[8] In such instances, courts may invoke the principle of contractual justice as an interpretive guide, not to override positive law, but to mitigate its excessive effects and restore balance between the parties (Tamaš, 2009, p. 3; Flume, 1992, p. 497). The debate concerns not the applicability of this principle, but how, when, and to what extent it should be applied (Bitrakov, 2025, p. 324; Strohsack, 1995, p. 57). This theoretical understanding of contractual justice shapes the interpretation of individual relationships and provides the normative foundation for doctrines such as *rebus sic stantibus*, enabling courts to address profound changes in circumstances and preserve contractual equilibrium in exceptional cases.

Although contract law is fundamentally based on the principle of *pacta sunt servanda*, strict enforcement of an agreement may, in certain cases, contradict the principle of contractual justice (Dagan and Dorfman, 2021, pp. 4-5; Caro Gándara, 2022, p. 275). These situations are addressed by the doctrine of *rebus sic stantibus*, which constitutes a key exception to the duty to perform contractual obligations. The doctrine applies where a subsequent change of circumstances alters one party's performance so significantly that maintaining the contract unchanged would be inequitable. It rests on the principle that a contract remains binding only as long as the circumstances substantially reflect those at the time of its conclusion and have not fundamentally changed (Karlović, 2011, pp. 17-18). Consequently, modification or adaptation of contractual terms may sometimes be necessary to avoid outcomes contrary to the principle of contractual justice and other core principles of contract law (Dolenc, 2003, pp. 594-611; Lando and Beale, 1995; Stone, 2002). Although the general principle of objectivity governs contract law, particularly commercial law, the doctrine of *rebus sic stantibus* can, based on the principle of contractual justice, also be invoked in cases involving subjective considerations. This was confirmed in research examining the invocation of the doctrine in cases where personal performance would breach human dignity in a contract between two entrepreneurs (Patakyová, Gambličková and Patakyová, 2017, pp. 64-73). Thus, *rebus sic stantibus* provides a general legal foundation for considering the principle of justice when assessing contractual relationships.

[5] Bürgerliches Gesetzbuch [BGB] [German Civil Code], promulgated on 18 August 1896 (RGBl. S. 195) as amended. The German legal concept of *Treu und Glauben*, embodies the idea that parties must act honestly, fairly, and with mutual consideration in the performance and enforcement of their contractual obligations.

[6] Allgemeines bürgerliches Gesetzbuch [ABGB] [Austrian Civil Code], promulgated on 1 June 1811 (JGS Nr. 946/1811) as amended. In Austrian law, the doctrine of the disappearance of the basis of the transaction (*Wegfall der Geschäftsgrundlage*) is recognised in case law through an analogical application of provisions concerning mistake and unforeseen circumstances (§§ 871, 872, and 914 ABGB), but remains uncodified in the ABGB itself (Moser, 2024).

[7] Obligacijski zakonik [Obligations Code], Uradni list RS, št. 83/2001, with subsequent amendments.

[8] The importance of moral principles in law was illustrated by the case of *Riggs v. Palmer*. In this case, a grandson, Elmer, murdered his grandfather in order to inherit under his will. Although the statute did not expressly prohibit inheritance in such a situation, the court ruled otherwise. It relied on the principle *nemo ex suo delicto meliorem suam conditionem facere potest* (no one may improve their position through their own wrongdoing), which represents one of the fundamental standards of justice. Through this example, Dworkin demonstrated that law is not merely a system of rules but also encompasses moral principles that enable judges to reach fairer decisions.

As the doctrine was initially not legally codified in most European countries, it primarily developed through case law. Its evolution was driven by concrete instances of disrupted contractual equilibrium that arise in different ways and for various reasons. Courts sought a legal basis for intervening in the contractual will of the parties by invoking the principles of contractual justice, "*good faith and fair dealing*" (*Treu und Glauben*). Intervention was justified where insistence on the original contract would have produced a "*result devoid of law and justice*" (Flume, 1992, p. 497). However, given the fundamental importance of the principle of *pacta sunt servanda* for legal certainty, the doctrine was permitted only in exceptional cases (Ridder and Weller, 2014, p. 384; Huguenin, 2019, pp. 102-104; Juhász, 2020, pp. 61-64).

Although the primary objective of courts across European countries was the same - to restore a fair balance between contractual obligations, the consequences of the case-by-case development of the doctrine are reflected in differing assumptions, outcomes, and terminologies. Due to its growing significance, the doctrine has, over the past thirty years, been incorporated as a general rule into the legislation of many European countries.[9]

As part of the research into the significance of the doctrine of *rebus sic stantibus* in the age of AI, an analysis of the legal frameworks of the following countries was conducted: Slovenia, Germany, France, Italy, Switzerland, Spain, Belgium, Estonia, Romania, Serbia, Croatia, Portugal, the Netherlands, Poland, the Czech Republic, Slovakia, Denmark, Sweden, and Hungary, [10] as well as the characteristics of English law.

English law, unlike continental systems, still treats changed circumstances narrowly. After *Paradine v. Jane* (1647) [11] entrenched the doctrine of absolute contracts, only the frustration-of-purpose exception emerged, epitomised by *Krell v. Henry* (1903).[12] Modern

[9] Over the past 30 years the doctrine was codified in Lithuania in 2000 (Art. 6.204, Lietuvos Respublikos civilinio kodekso patvirtinimas, 2000 m. liepos 18 d., Nr. VIII-1864), in Estonia in 2001 (Art. 97, Võlaõigusseadus. Vastu võetud 26. september 2001, RT I 2001, 81, 487, jõustumine 1. juuli 2002) in Germany in 2002 (§ 313, Gesetz zur Modernisierung des Schuldrechts vom 26. November 2001 [BGBl. I S. 3138]; Rösler, 2007, p. 490), in Romania in 2011 (Art. 97, Codul civil; Hlušák, 2022, p. 364) in the Czech Republic (Art. 56, Zákon č. 89/2012 Sb., Občanský zákoník) and and Hungary (Art. 6:60, 2013. évi V. törvény a Polgári Törvénykönyvről) in 2014, in France in 2016 (Art. 1195, Code Civil; Pédamon, 2017), and in Belgium in 2023 (Art. 5.74, Code Civil, à loi du 28 avril 2022 portant le Livre V « Les obligations »). The doctrine had already been codified more than 30 years ago and remains in force in: Italy in 1942 (Art. 1497, Codice Civile, Testo del Regio Decreto 16 marzo 1942), The same doctrine - already codified in the former Socialist Federal Republic of Yugoslavia in 1978 (Law on Obligations [Official Gazette SFRY No. 29/78]) - has been preserved, in substance, in the legislation of the successor states: Slovenia, Croatia, Serbia, Bosnia and Herzegovina, North Macedonia, Montenegro, and Kosovo. The currently applicable provisions are: Slovenia (Art. 112, Obligacijski zakonik), Croatia (Art. 369, Zakon o obveznim odnosima), Serbia (Art. 133, Zakon o obligacionim odnosima), Bosnia and Herzegovina (Art. 133, Zakon o obligacionim odnosima), North Macedonia (Art. 122, Zakon za obligacionite odnosi), Montenegro (Art. 128, Zakon o obligacionim odnosima), and Kosovo (Art. 116, Zakon o obligacionim odnosima), in the Netherlands in 1992 (Art. 6:258, Burgerlijk Wetboek; Schrage, 1992) and in Poland in 1996 (Art. 357.1, Kodeks Cywilny; Darowski, 2020). The need to codify the doctrine of *rebus sic stantibus* was also pointed out in Switzerland in 2013 (Huguenin and Hilty, 2020), but the 2020 reform ultimately did not enact such a clause; in Spain, proposals advanced in 2009 and again in 2023 (Fuster, 2021; Propuesta de modernización del Código Civil en materia de obligaciones y contratos [Ministerio de Justicia, 2023], pp. 104–105) have likewise not yet been incorporated into legislation.

[10] See, for example, Art. 1195 Code Civil (France); Arts. 1467-1469 Codice Civile (Italy); Art. 437 Código Civil (Portugal); Arts. 6:258 and 6:260 Burgerlijk Wetboek - BW (Netherlands); Art. 5.74 Code Civil (Belgium); Arts. 357.1 and 358.1 Kodeks Cywilny (Poland); Arts. 1764-1766 Občanský zákoník (Czech Republic); Art. 36 Aftaleloven (Denmark); Art. 36 AvtL (Sweden); Art. 97 Võlaõigusseadus - VÕS (Estonia); Art. 6.204 Lietuvos Respublikos civilinio kodekso patvirtinimas - LR CK (Lithuania); Art. 6:60 Polgári Törvénykönyvről - Ptk. (Hungary); and Art. 1271 Codul Civil (Romania).

[11] *Paradine v. Jane (1647) Aleyn 26; 82 E.R. 897.*

[12] *Krell v. Henry [1903] 2 K.B. 740 (C.A.).*

courts invoke it sparingly - e.g., *Canary Wharf v. EMA* (2019, Brexit lease)[13] and *Salam Air v. Latam* (2020, COVID-19 aircraft lease) [14] - and may merely terminate, never revise, a frustrated contract (Schramm, 2018, p. 31; Baranauskas and Zapolskis, 2009, p. 203).

By contrast, continental systems embrace a far broader response to changed circumstances. *Rebus sic stantibus* is acknowledged in every jurisdiction examined and is now codified in almost all of them. Only Switzerland, Austria, Spain, and Slovakia still rely mainly on case-law or sector-specific provisions. However, the reform projects in Switzerland and Spain indicate a growing need to adopt a general statutory clause.[15]

From the perspective of the application of the principle of contractual justice, it is particularly important to note that the vast majority of the analysed jurisdictions allow not only for the judicial termination of a contract but also for its judicial adaptation.[16] Among all the analysed systems, only Slovakia, Italy, Serbia, Slovenia and English law do not permit judicial modification of the contract.[17] Nevertheless, even in these countries, initiatives for change can be observed, expressed in various ways.[18] In Italy, a draft reform of the Civil Code (*legge delega no. 1151*)[19] was prepared in 2019, which included a proposal allowing courts to adapt contracts in order to reestablish a fair economic balance between the parties' obligations as originally agreed (Sirena and Patti, 2020, p. 14). The legal regimes of Serbia and Slovenia are substantively very similar, as both countries have preserved the rules from the former Yugoslav legal tradition. Although these systems currently permit only the judicial termination of contracts, there is an increasing movement toward reforms that would authorise courts to modify or adapt contractual terms. In Serbia, such a change was proposed in the draft Serbian Civil Code,[20] whereas in Slovenia, similar initiatives have been raised particularly in relation to lease agreements during the COVID-19 pandemic (Samec Berghaus and Drnovšek, 2020; Drnovšek, 2016, p. 496).

[13] *Canary Wharf (BP4) T1 Ltd v European Medicines Agency [2019] EWHC 335 (Ch).*

[14] *SAOC v Latam Airlines Group SA [2020] EWHC 2414.*

[15] In Spain, a general statutory clause was initially proposed in 2009, with an updated draft following in 2023. Under the new proposed amendment, the issue of changed circumstances would be addressed in Article 1238 of the Código Civil, with the proposal substantively following the arrangements in international legal acts (Propuesta de modernización del Código Civil en materia de obligaciones y contratos, Ministerio de Justicia, Madrid, 2023, pp. 104–105). In Switzerland, efforts to regulate the *rebus sic stantibus* clause emerged within the context of the extensive 2013 reform proposal of the Code of Obligations. The draft reform envisaged a new general rule entitled "change of circumstances" (Ger.: *Veränderung der Umstände*). The primary objective of the reform was to codify the foundational principles of the doctrine of changed circumstances, as developed in Swiss case law and legal scholarship, without altering their substance in any way (Huguenin and Hilty, 2013, p. 61).

[16] Judicial adaptation is, for example, allowed in the following analysed jurisdictions: Germany (§ 313, Bürgerliches Gesetzbuch), Austria (Bollenberger in Koziol et al., 2007, p. 881), Croatia (Art. 369, Zakon o obveznim odnosima), Czech Republic (Art. 1764, Občanský zákoník), France (Art. 1195, Code Civil), Spain (Juzgado de Primera Instancia No. 81 de Madrid, Auto 447/2020 of 25 Sept 2020, Proc. 473/2020), Switzerland (Schwenzer, 2016, pp. 449–505), Portugal (Art. 437, Código Civil), Netherlands (Art. 6:258, Burgerlijk Wetboek), Belgium (Art. 5.74, Code Civil), Poland (Art. 358.1, Kodeks Cywilny), Denmark (Art. 36, Aftaleloven), Estonia (Art. 97, Võlaõigusseadus), Lithuania (Art. 6.204, Lietuvos Respublikos civilinio kodekso patvirtinimas), Hungary (Art. 6:60, Polgári Törvénykönyvről), and Romania (Art. 1271, Codul civil).

[17] Slovakia (Art. 356, Obchodný zákonník), Italy (Art. 1467, Codice Civile), Serbia (Art. 133, Закон о облигационим односима), Slovenia (Art. 112, Obligacijski zakonik), and English law (Schramm, 2018, p. 31).

[18] Based on the conducted research and the review of available literature, Slovakia was the only jurisdiction among those analyzed where no initiatives aimed at enabling judicial adaptation of contracts were identified.

[19] Disegno di legge (d.d.l.) delega n. 1151 del 2019, Delega al Governo per la revisione del codice civile.

[20] *Преднацрт Грађанског законика Републике Србије* [Draft of the Civil Code of the Republic of Serbia], 28. 05. 2019. Availlable at: https://www.paragraf.rs/nacrti_i_predlozi/280519-prednacrt-gradjanskog-zakonika-republike-srbije.html (accessed on 8.11.2025).

The legal systems of all the other analysed countries (Germany, France, Switzerland, Spain, Belgium, Estonia, Romania, Croatia, Portugal, the Netherlands, Poland, the Czech Republic, Denmark, Sweden, and Hungary) allow for the possibility of a claim seeking judicial modification or adaptation of the contractual relationship, either based on statutory provisions or through case law.[21] The trend toward judicial flexibility in contractual relationships has become particularly evident in recent years, as the possibility of judicial adaptation has been incorporated into every legislative reform concerning changed circumstances adopted over the past thirty years.[22]

An analysis of more than twenty European jurisdictions shows that the doctrine of *rebus sic stantibus* is recognised across all examined systems, with judicial adaptation of contractual relationships either permitted or increasingly advocated in all but English and Slovak law. In many jurisdictions, adaptation takes precedence over termination, which is allowed only where adaptation is not possible. The resistance of English law to this trend is expected, given the strong attachment to the *principle of sanctity of contract* in common law systems (Beale, 2017, p. 23-007; MacMillan, 2014, p. 278).[23] Overall, judicial flexibility in adjusting contracts to changed circumstances has become a key feature of modern European contract law, reinforcing the role of unwritten legal principles. The full application of the principle of contractual justice requires that courts be able to intervene in contractual content and equitably redistribute risks. Where only termination is available, an "all-or-nothing" solution prevails, preventing a fair balance of the parties' interests.

3. SMART CONTRACTS AND ARTIFICIAL INTELLIGENCE

While "smart" often connotes "intelligent", a smart contract does not involve AI. The adjective merely signals greater functionality than traditional paper agreements - above all, automated execution. As Szabo (1996) put it, smart contracts are "*far more functional than their inanimate paper-based ancestors; no use of artificial intelligence is implied*." Because smart contracts cannot think, learn, or decide, several authors regard the label as misleading (Samec Berghaus and Drnovšek, 2018a, p. 28; Surden, 2024, p. 37).

Although digital contracting has been possible for years, smart contracts attracted real interest only after the arrival of blockchain, whose architecture allows code-based agreements to self-execute once predefined conditions are met (Hsiao, 2017, p. 687; Mik, 2017, p. 270; Raskin, 2017, p. 315). In private-law terms, a smart contract is simply an agreement expressed in computer code that runs automatically when those conditions occur (Drnovšek, 2018, p. 730; Raskin, 2017, p. 310). Once written to a validated block, the code is time-stamped and immutable; any correction requires a new smart contract (Kiviat, 2015, p. 579). Because of this immutability, smart contracts are deployed on decentralised platforms that resist outside interference.[24] Interaction with

[21] For cited relevant statutory law, see footnote 16.

[22] The doctrine of changed circumstances was newly regulated in Lithuania and Estonia in 2001, in Germany in 2002, in Romania in 2011, in the Czech Republic and Hungary in 2014, in France in 2016, and in Belgium in 2023, see footnote 9 for cited relevant statutory law.

[23] In view of the courts' restrictive approach to the doctrine of frustration, recent rulings have addressed the matter in the cases Canary Wharf Group v. EMA and Salam Air SAOC v. Latam Airlines Group SA. The former concerns the changed circumstance of the United Kingdom's withdrawal from the European Union, while the latter relates to the COVID-19 pandemic.

[24] Among the leading platforms for the deployment and execution of smart contracts are Ethereum, Polkadot, Ripple, and Tron.

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the off-chain world is mediated by oracles - software, hardware or human services that supply external data to the chain (Damjan, 2018, pp. 379-403; Beniiche, 2020, p. 1).

Smart contracts execute deterministically: once coded rules are met, performance is automatic. By contrast, AI works on live data, learning from past inputs and adapting its outputs. Although no single definition commands consensus, most describe AI as software that mimics human cognition - perception, reasoning, learning and adaptation (Häuselmann, 2022, p. 44). Machine-learning (ML) techniques give computers this "human-like" capacity. Rather than following step-by-step code, an ML model distils patterns from data and refines its predictions with every new cycle (Patel 2024, p. 3). In practice, AI ingests large data sets, extracts regularities and then applies them autonomously to concrete tasks (Virovets, Obushnyi, Zhurakovskyi, Skladannyil and Sokolov, 2024, p. 41). From a legal-theory standpoint, AI therefore approximates human intelligence - yet its decision making is statistical, not discretionary, a distinction that becomes critical when contracts call for value-based judgements.

Growing interest now centres on fusing AI models with blockchains, a convergence dubbed Blockchain Intelligence (Li et al., 2024, p. 6634; Zheng and Dai, 2019; Zheng et al., 2021, p. 2). Proponents argue that embedding AI engines in on-chain code would finally deliver truly smart contracts, able to learn and adapt on decentralised platforms (Ouyang et al., 2022, p. 1; Li et al., 2024, p. 6634). Because the term "smart contract" is already fixed in the literature for simple self-executing code, scholars label these AI-enabled versions "intelligent contracts" (Ouyang et al., 2022, p. 2; Stathis, Trantas, Biagioni, et al., 2024, p. 1; Patel, 2024, p. 1).

AI can make smart contracts more adaptive, user-friendly, and efficient (Li et al., 2024, p. 6634). Integration is either on-chain - the model is hard-coded into the contract - or off-chain, where an AI module feeds the contract through an intelligent oracle (Patel, 2024, p. 3; Ouyang et al., 2022, p. 5; Reshi, Khan, Shafi et al., 2023, p. 2).[25] In practice, only niche networks now use such "intelligent clauses" to automate narrow, repetitive tasks (Virovets et al., 2024, p. 42). Embedding AI, however, would in principle let a contract itself analyse data, learn, reason, and act autonomously.

Numerous legal scholars have identified the rigidity of ordinary smart contracts as a core weakness (Drnovšek, 2018, pp. 744-46; Samec Berghaus and Drnovšek, 2018b, pp. 52-54; Vasiu and Vasiu, 2024, p. 114; Sklaroff, 2017, pp. 263-303). Because an intelligent contract can examine vast data sets and take rule-based decisions that approximate human reasoning, the key question is whether these capabilities could enable true automatic contractual adaptation.

Based on the characteristics of AI outlined above, one could imagine that the parties to an intelligent contract might formulate a hardship clause in descriptive terms, for example, by stipulating that in the event of significant currency devaluation, the agreed payment amount should be appropriately adjusted. Such a clause would rely on the application of a simple legal standard, the specific content of which could be determined based on the concrete circumstances of each individual case.[26]

Given the ability of an intelligent contract to process and analyse large volumes of input data, it can be envisaged that the scope of autonomous adaptability might also extend to other instances of changed circumstances. As an illustrative example, one

[25] An example of an intelligent oracle is the Chainlink project. It is a decentralised blockchain-based oracle network built on the Ethereum platform. Each oracle in this system collects data from independent sources and cross-verifies the information to ensure its accuracy.

[26] In the case of a descriptive clause, it is not necessary to precisely define all the conditions and anticipated consequences in advance. The use of the legal standard "appropriately adjust" allows for various possibilities of adaptation depending on the different types of changes in circumstances.

might consider an intelligent lease agreement, connected to an intelligent oracle, that gathers data on various factors affecting lease relationships. Using such a contract could, for instance, autonomously adjust the amount of rent if, after the conclusion of the agreement, there were a (significant) change in the taxation rate applicable to rental income.[27] At least theoretically, by incorporating various AI modules, intelligent contracts could be capable of autonomously adjusting contractual content in response to different types of changed circumstances. Hypothetical examples of such autonomous adjustments might include: extending a delivery deadline due to a natural disaster, adjusting an insurance premium based on the frequency or probability of loss events, adjusting electricity prices based on real-time supply and demand on the market, or modifying hotel reservations due to flight delays or temporary suspensions of air traffic.

4. THE ROLE OF THE PRINCIPLE OF CONTRACTUAL JUSTICE IN THE CONTEXT OF ARTIFICIAL INTELLIGENCE

Although intelligent contracts can enable the simulation of human reasoning and the automatic adaptability of contractual content, it is important to highlight numerous limitations that significantly affect their practical value. Challenges are also related to important legal and security requirements; therefore, the effective use of intelligent contracts depends on how well these issues are addressed (Vasiu and Vasiu, 2023, pp. 107-122).[28] First, it can be observed that many types of contractual relationships, due to the nature of performance obligations (e.g., obligations of effort, personal performance obligations, etc.), cannot be written in an algorithmic format (computer code). Moreover, the autonomous adaptability of intelligent contracts is generally limited to monetary obligations and certain ancillary elements of contracts (such as deadlines for performance). While transactions are anonymous (as wallet addresses do not reveal the identity of the owner), all transactions are linked to the same wallet address and remain permanently visible and publicly accessible, raising numerous privacy concerns (Taherdoost, 2023, pp. 12-13). Another critical issue in connection with intelligent contracts is the reliability and trustworthiness of the data obtained, since there is a risk of erroneous machine interpretation and other errors (Li et al., 2024, p. 6639). In addition, several general challenges can be identified, such as high programming costs, technical feasibility problems, the increasing need for storage space in blockchain networks, the difficulty of ensuring proper execution in the event of content modification, and energy consumption concerns.

From the perspective of legal science, it is also important to emphasise the issue of legal enforceability. No technological solution can replace the legal regulation of contractual relationships. To be legally enforceable, intelligent contracts must comply with the requirements of contract law (Vasiu and Vasiu, 2023, p. 113). Despite automated execution, the contractual will, necessary for the conclusion (and performance) of a legally binding transaction, can only be formed by human parties, not by machines.

[27] A change in the amount of tax impacts the position of the lessor, who receives a reduced counterperformance (rent) for the same contractual subject matter (the lease of real estate) compared to the time when the smart contract was concluded. Where the change is substantial, it results in a disruption of the contractual equilibrium between the parties.

[28] The most concerning vulnerabilities and risks associated with smart contracts include reentrancy, overflow, block randomness, call stack depth, timestamp dependency issues, transaction ordering dependency, data withholding, access control problems, unchecked request vulnerability, and denial of service (Vasiu and Vasiu, 2023, p. 116). Such vulnerabilities highlight the critical need for rigorous smart contract design, thorough auditing, and ongoing risk assessment.

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Regardless of whether the parties conclude a contract entirely in the form of computer code or simply encode specific contractual provisions (e.g., payment execution), the assessment of the legal relationship is governed by classical rules of contract law (Drnovšek, 2018, p. 747; Maydanyk, 2024, pp. 18-20; Máté, 2023, p. 70). Consequently, this also raises questions regarding the admissibility of smart contracts as evidence and their qualification as a means of evidence in civil procedure (Kaczmarek-Templin, 2023, pp. 65-76).

A crucial feature of contractual relationships, often overlooked by non-lawyers, is their multi-layered and complex nature. Precisely because of this complexity, contract law relies on principles, customs, legal standards, indeterminate legal concepts, and other unwritten legal rules. Simple contractual relationships typically do not lead to disputes or require complex legal interpretation. Although the autonomous adaptation of simple agreements (e.g., the annual extension and adjustment of subscription fees for certain services) simplifies the processes of contract formation and execution, from a legal science perspective, it does not represent a major advancement, as it merely addresses practical issues rather than resolving deeper legal questions. Certain consequences that most frequently trigger legal disputes, such as the assertion of defects, warranty claims, and similar matters, cannot be fully encoded in computer code (compare Samec Berghaus and Drnovšek, 2018b, pp. 50-52). Moreover, there is even a likelihood that the automation of performance or even contractual adaptation could itself generate new legal issues (e.g., the automatic extension of a subscription despite the termination of the contractual cause or the death of the subscriber).

Precisely because of the complexity of legal relationships, AI will never be able to replace the judicial assessment of the specific circumstances of an individual case in the field of contract law, especially where such assessment also relies on unwritten sources of law. One such example is the equitable modification or adaptation of contractual content when circumstances fundamentally change after the conclusion of a contract (doctrine *of rebus sic stantibus*). In deciding such cases, courts must take into account a wide range of particular circumstances; general or statistical analysis alone (such as that provided by AI) is insufficient to achieve a truly fair decision.

This can be simply illustrated by a contemporary example: the completely unexpected imposition of tariffs on imported goods into the United States in 2025. If, practically overnight, tariffs of 30% or more are introduced for certain goods, this almost certainly constitutes a fundamental change of circumstances that disrupts the contractual equilibrium. Regardless of the volume of data processed by AI, it can consider only statistical information about expected tariff increases, average of traders' profit margins, or analyses of similar court cases from the past. It cannot, however, account for the particularities of the individual case, which are crucial for *de facto* fair redistribution of risk according to contractual justice. A 30% tariff surcharge may require entirely different redistributive outcomes even between cases that appear similar. Although a judge must not decide based on subjective feelings of fairness but rather in accordance with socially accepted standards of fairness prevailing at the relevant time and within the relevant environment (compare Bitrakov, 2025, p. 324; Tamaš, 2009, p. 5), the judge must also consider the specificities of each individual case to reach a fair outcome (*principle of contractual justice*). In deciding how to allocate the burden of the 30% tariff, the judge must take into account factors such as the economic position of the parties in the case at hand, the profit margins of each party, the volume and frequency of business transactions, the contractual distribution of risks, the impact of the increased burden on the financial situation of each party (so-called *Einzelfalgerechtigkeit*), etc. Only by considering these concrete circumstances - alongside general or statistical analyses that

artificial intelligence can provide - can a judge reach a decision that *de facto* reflects a just solution in the individual case.

5. CONCLUSION

Based on the research conducted, it can be concluded that AI can, to a certain extent, enable the automatic adaptability of contractual arrangements in cases of changed circumstances. Nevertheless, the autonomous adaptation of intelligent contracts is feasible only for simple contractual relationships and even then only within a very limited scope. In the context of contract law and the doctrine of *rebus sic stantibus*, it is particularly important to note that AI cannot replace judicial decision-making, as it cannot apply the *rebus sic stantibus* clause or other unwritten sources of law in the same manner as a judge. AI is capable only of providing general and statistical analyses, which are insufficient for the proper assessment of contractual relationships. Since contract law is fundamentally based on the free will of the contracting parties, any use or interpretation of legal rules must not disregard the human element. Every contract is the result of the specific circumstances, interests, negotiations, and expectations of particular individuals at a given time and place. The assessment of fair and proportionate contractual obligations, and any decision regarding the potential adaptation of contractual content, requires an individualised approach based on a detailed analysis of the particular circumstances of the case at hand. Such an evaluation can be ensured only by a judge, taking into account the principle of contractual justice and other unwritten legal sources. Consequently, the research hypothesis is confirmed: the automated nature of smart contracts, due to their algorithmic rigidity, poses a challenge to fairness and flexibility in contract law. Even - and especially - in the age of AI, it remains essential to preserve the role of judicial discretion and unwritten legal sources as fundamental corrective mechanisms for ensuring fairness in contractual relationships. Accordingly, even in the context of smart and intelligent contracts, the effective application of the *rebus sic stantibus* principle requires judicial oversight to ensure that contractual adaptations remain consistent with the principles of fairness and justice.

To preserve contractual justice in a digital environment, adjudication under the rebus sic stantibus principle must be coupled with enforceability pathways. *Ex ante*, the parties should assume a duty to renegotiate in hardship and specify a temporary standstill in automated execution. *Ex post*, where code cannot be altered, the law should oblige the parties to implement the court's decision by re-implementing a corrected on-chain agreement or by concluding a replacement contract that reflects the ordered adaptation, with appropriate remedies where implementation is withheld. By "*temporary standstill in automated execution*" we mean a contractually pre-agreed suspension of further automated performance (e.g., escrow releases, recurring transfers or milestone payments) once a dispute is raised or specified circumstances occur; it operates prospectively and does not undo transactions already finalised on the ledger.

Consequently, the integration of AI tools into contract law should serve solely as a supplementary instrument rather than as a substitute for human judgement. Future developments in AI-assisted contract law should focus on establishing hybrid frameworks that combine the technological capabilities of AI with human judgement, ensuring that innovation does not undermine legal certainty, fairness, or the adaptive mechanisms inherent in contract law. In this way, contract law can be optimised through the integration of AI without compromising its fundamental principles.

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