Among substantial advancements challenging contemporary contract law special attention is given to autonomous, cryptographic solutions based on decentralised infrastructure provided by blockchain technology, intended to execute transactions automatically, designated as smart contracts. The need for comprehensive research on legal implications of practical implementation of this technological innovation is triggered particularly by the prognostications declaring it a valid alternative to hitherto contract law framework that is expected to be ultimately replaced by algorithmic mechanisms underpinning smart contracts.

A relevant assessment of the impact smart contracts are presumed to have on the contract law domain requires a thorough analysis of their juridical status. The specificity of the category of smart contracts raises doubts whether they comply with the definition criteria inherent to contract law terminology. Additionally, it is of material importance to determine the function smart contracts can perform in the sphere of contractual practice and to confront it with the role and axiology of contract law.

The article aims at analysing the peculiarities of smart contracts from the perspective of the Polish private law system with account being also taken of current development tendencies concerning the concept of contract.

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1. INTRODUCTION
The current phase of development in the sphere of digital technologies brings multifarious implications which private law framework needs to be confronted with. Intricate questions being raised for consideration in the context of unprecedented progress mainly in digitisation and automation processes induce to verify whether the essential private law institutions remain appropriate and functional. This refers in particular to the domain of contract law deemed notably exposed to novel tendencies regarding innovative patterns of arranging and conducting economic exchange. Among substantial advancements challenging contemporary contract law special attention is given to autonomous cryptographic solutions based on decentralised infrastructure provided by blockchain technology, intended to execute and enforce transactions automatically, designated as smart contracts. The need for comprehensive research on legal ramifications resulting from practical implementation of this technological innovation is triggered particularly by the prognostications declaring it a valid alternative to hitherto contract law framework that is expected to be ultimately replaced by algorithmic mechanisms underpinning smart contracts.

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comply with the definition criteria inherent to contract law terminology. Additionally, it is of material importance to determine the function smart contracts can perform in the sphere of contractual practice and to confront it with the role and axiology of contract law considering also current development tendencies concerning the concept of contract.

Without pretending to explore the question conclusively, the analysis will cover selected issues regarding the properties of smart contracts in the light of Polish private law with a view toward delineating debatable aspects that shall affect qualification of this technological innovation in legal terms.

2. DEFINITIONAL ASSUMPTIONS AND TERMINOLOGICAL QUERY ABOUT SMART CONTRACTS

In respect of smart contracts’ technological peculiarities to be juxtaposed with private law institutions, it is argued that a distinctive hindrance to comprehensive analysis thereof consists in terminological inappropriateness and misapplication of conceptual framework

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appertaining to contract law.\textsuperscript{7} The category of smart contracts is defined\textsuperscript{8} essentially\textsuperscript{9} by reference to a type of computer programmes operating autonomously\textsuperscript{10} on distributed, decentralised database secured cryptographically, denominated as blockchain, enabling automatic and irrevocable performance and execution of transactions, once the predefined conditions are met.\textsuperscript{10} Purportedly, blockchain technology underlying smart contracts provides a mechanism of recording any transaction performed on the network and distributing a copy of it among single nodes involved upon prior consensus in verification ("validation") procedure, without the need for recourse to trusted institutional intermediaries.\textsuperscript{11} One should, however, take account of avowed diversity of smart contracts and

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multiplicity of blockchains’ structures as well as manifold configurations in which particular smart contracts can act upon respective blockchains.\(^{12}\)

Accordingly, due to conspicuous heterogeneity of smart contracts forms it is necessary to emphasise that actually only some of them can be ultimately examined in terms of congruence with legal constructs and, where appropriate, equated with contracts in juridical sense.\(^{13}\) In this context, the very denomination granted to smart contracts requires a critical analysis. Above all, anticipating further study and without losing sight of the complexity of contract definition in different legal traditions,\(^{14}\) it should be stated that in case of the designation under consideration the reference to the concept of contract appears to be rather a hyperbole.\(^{15}\) It seems symptomatic that smart contracts tend to be characterised in terms

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of imitation of conventional ones. Moreover, regardless of the quality of a specific neosemantism attributed to the examined concept, substantial controversies surround the intention that allegedly the category of smart contracts demonstrates capability resembling human intelligence or exceptional operability and trustworthiness. This argument is reflected in an ongoing discussion associated with the search for an exact Polish language equivalent for the term in question.

3. CONCEPTUALISATION OF CONTRACT UNDER POLISH LAW: AN OUTLINE

For the purpose of the analysis a synthetic insight into the concept of contract under Polish law is needed with the aim of providing a relevant point of reference. It should be indicated that there is no legal definition of contract in contemporary Polish private law system. According to the widely accepted doctrinal position, a contract shall be defined

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as a juridical act involving (at least) two parties and requiring unanimous declarations of intent. Worthy of note is that a definition of similar wording has been proposed within the framework of the recodification process in the previous draft of the book one of the new Polish civil code published in 2008 by the Civil Law Codification Commission at the Ministry of Justice, eventually rejected upon its thorough revision in 2015. Consistently, a historically conditioned approach based on consensus as a crucial element of contract remains of significant importance, along with the assumption according to which a contract shall be considered a socially relevant act. As determined by current approach, a contract serves as an institution intended to enable autonomous private law entities to regulate legal relations by virtue of their own decisions, however, under

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19 Cf. Brzozowski, A. (2013) Op. cit., pp. 490–491; Strugała, R. (2013b) Standardowe klauzule umowne: adaptacyjne, salwatorjne, merger, interpretacyjne oraz pactum de forma. Warszawa: Wydawnictwo C.H. Beck, p. 15. By contrast, prerequisites required to be met for establishing the existence of a contract were provided for in art. 50 of the Code of Obligations which read that a contract is formed by a unanimous declaration of intent made by two parties one of which commits to render a performance and the other accepts this commitment (§ 1) and that the subject matter of a contract may be also creation, modification or termination of a legal relation without commitment to render performance (§ 2). On this issue, see i.a.: Pecyna, M. (2013) Merger clause jako zastrzeżenie wyłączności dokumentu, klauzula integralności umowy, reguła wyklętni umowy. Warszawa: Lex a Wolters Kluwer Business, p. 179.
authority and control of law.\textsuperscript{25} A key role is attributed to the freedom of contract principle,\textsuperscript{26} declaring that the parties entering into a contract may arrange the legal relation at their own discretion, on the condition that its content or purpose are not contrary to the nature of the relation, a normative act or principles of social coexistence.\textsuperscript{27} Within the above limits contracting parties are regarded competent\textsuperscript{28} to create specific rules binding between them (\textit{lex contractus}), which influence the content of obligation.\textsuperscript{29} Theoretical construct of contractual freedom is based, to a material extent,


upon regulatory (normative) character of a contract creating an obligation. In this regard, contract constitutes a norm-setting act, as reflected in the mechanism covering the effects it gives rise to. The underlying rule is declared to be of cardinal importance for the whole framework of the civil law system. Accordingly, a contract entails not only the effects expressed therein but also those that follow from a normative act, principles of social coexistence and established customs. Thus, in terms of determining the content of obligation, encompassing the rights and duties of the parties, the content of contract ascertained adequately within the process of its

interpretation constitutes but one among a number of factors to be considered.

On account of a contract being perceived in essence as the parties’ self-commitment, the *pacta sunt servanda* principle applies. It requires that the contract be performed in accordance with its content. Exemptions from this principle are allowed in certain cases on grounds of a statutory provision or the parties’ common intent. Worthy of particular note is the attempt to harmonise the *pacta sunt servanda* principle with the *rebus sic stantibus* clause regarding the influence of a change of circumstances on obligations. One shall, however, draw attention to an argued need to reconsider the term *pactum* (agreement) represented in the above principle on account of currently identified symptoms of the so-called decodification process in the domain of private law.

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to be reckoned with under this approach shall be the crisis of the liberal theory of contract as an expression of the parties’ autonomy of will, as well as the 19th century paradigm of civil law codification designed as a comprehensive system with a view to ensuring the certainty of law.\textsuperscript{41} Consequently, mainly in case of a considerable asymmetry between the contracting parties’ positions, particular significance is attached to legitimate, justifiable expectations of the creditor. Therefore, in the light of the assumed redefinition of the concept of \textit{pactum} in the foregoing context, when determining the due performance the priority is envisaged to be given to “what could have been justifiably expected by the creditor at the contracting stage” instead of “what has been planned substantively”.\textsuperscript{42} Pursuant to this view, what shall be anticipated is a systemic change to law of contractual obligations expressed by surpassing in a far-reaching manner the content of the parties’ declarations of intent as well as statutory provisions in order to retrieve the social and economic sense of contract.\textsuperscript{43}

Against this particular background delineated above, taking into account the multidimensional ambience in which, essentially, any research devoted to the very nature of contract and contractual obligation shall be placed, a critical analysis outlining some aspects of the smart contracts’ juridical import will be undertaken.

4. CRITICAL ANALYSIS OF SMART CONTRACTS’ JURIDICAL RELEVANCE: AN OUTLINE

As argued in doctrine, the principal classification of blockchain-based smart contracts encompasses the following categories: cryptocurrencies which constitute chronologically the first implementation of blockchain technology aimed at creating an uncomplicated system of cryptographic units transfer, on the one hand, and so-called complete smart contracts


utilising multifunctional programming languages, on the other hand.\textsuperscript{44} Due to the properties of programming languages complete smart contracts are deemed capable of expressing content of any relation and therefore necessitate being explored in more detail from the viewpoint of contract law.\textsuperscript{45} In this regard the scrutiny of smart contracts’ juridical relevance shall be preceded by drawing a distinction between dissimilar types of them. It is emphasised that one shall differentiate a smart contract itself embodying the binding expression of an agreement – as the only form of record (smart contract entirely written in code), from a smart contract implementing automatically a separate agreement expressed in natural language, and thus serving as evidence for the existence and the content of a conventional agreement (as a tool or carrier of a record reflecting a prior traditional contract frequently being a framework agreement or a conditional contract in nature).\textsuperscript{46} The former category, referred to as pure complete smart contracts,\textsuperscript{47} both instantiated and executed in a direct manner on the blockchain, warrants in particular closer attention. However, mainly due to complications connected substantially with translation of natural language contract into smart contract code, material legal problems have to be addressed also in regard to the latter category.

In formal terms, there is no impediment to express a legally relevant arrangement in a computer code by means of blockchain technology. As a general rule, freedom of declaration of intent form is enshrined under the Civil Code.\textsuperscript{48} Accordingly, subject to statutory exceptions the intention

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of a person performing a juridical act may be expressed by any behaviour which manifests that person’s intention sufficiently, including the intention being manifested in electronic format, it is hence possible to select any form of sign or means of communication as well as configuration thereof.\(^\text{49}\) In this regard, principally, smart contracts shall be granted legal relevance, as a specific expression of the parties’ intent to cause legal effect consisting in creation, modification or termination of a civil law relation.\(^\text{50}\) However, dual requirement must be taken into account when determining the completion of a declaration of intent as defined by Polish law. Any declaration of intent needs to be externalised so that it proves to be discernible, and manifested in a sufficient manner, that is in such a mode as to render it intelligible for the addressee. The latter refers not only to the type of signs used by the party performing a juridical act but also to the language, required to be at least decodable by the addressee, as well as to the way in which the respective wording is phrased.\(^\text{51}\) What constitutes an essential condition on this point is that the content of a declaration be unambiguously identifiable by use of interpretation methods, otherwise, in failure to establish any reasonable meaning of a given conduct, there are no grounds to recognise it as the completion of a declaration of intent.\(^\text{52}\)

In the above context, a particular question arises over the specificity of machine-readable format of the arrangement encoded in a smart contract. It is argued that the apprehension of the smart contract’s content poses considerable difficulties, mainly due to the artificial programming languages intricacies,\(^\text{53}\) with a risk of abuse by one party of the incomplete understanding by the other.\(^\text{54}\) Conceivably, it concerns both pure complete smart contracts formed and enforced entirely in the code and those originated as contractual documents drafted in natural language to be


translated consecutively into code. Additional determinant affecting smart contracts comprehensibility is the sequence of code conversions required in order to render the programme executable. The initial source code – while to some extent retaining intelligibility owing to its resemblance to natural language – is then subject to conversion into assembler code which, in turn, necessitates to be compiled into machine-executable bytecode. Consequently, there is a growing possibility of divergence between the parties’ common intent and the smart contract programme executed automatically.

What shall be viewed as a highly problematic issue in that regard is the interpretation of smart contracts’ content. This is mostly due to the particularity of interpretation based on the operation of source code compiler. In the light of the above considerations, the question as to possible replacement of contractual interpretation in the juridical sense by machine-driven interpretation pertaining to smart contracts as well as the very legal relevance of the latter, requires critical assessment. Whilst, on the one hand, it is argued that the existing contract law interpretative rules do not apply to machine-based interpretation of smart contracts, on the other there are calls for judicial activity supporting rational implementation of the Civil Code provisions regarding contractual interpretation in the domain of smart contracts. In line with a widely accepted approach, interpretation process encompasses a set of operations
leading subsequently towards establishing whether a given expression (arrangement of signs) manifested by the party performs the regulatory function and therefore constitutes a declaration of intent, and afterwards identifying its legally relevant meaning. The general interpretative rules applicable to contracts in Polish private law are structured according to so-called combined (subjective-objective) method which is axiologically conditioned. The methodology of interpretation process aims at considering respectively, to the extent appropriate, the real intention of the subject performing the declaration of intent (which refers also to the common intent of the contracting parties) and the reliance of third parties as well as the certainty of legal transactions. Thus, a declaration of intent shall be interpreted so as is required, in view of the circumstances in which it was made, by principles of social coexistence and established customs, whereas in contracts, one should examine the common intention of the parties and the aim of the contract rather than rely on its literal wording. Several characteristics of the process of smart contracts coding need to be analysed on this point. Essentially, the necessity to predetermine in advance, in a precise and comprehensive manner every condition to be met in order to automatically perform a predefined action, raises doubts as to consistency with the contract law framework, including the contractual interpretation model. The use of programming languages which serve to code smart contract terms results in considerable inflexibility that is found incompatible with both the inherent peculiarities and axiology of contract law and contract drafting practice. Yet, private law general clauses and open-textured standards (such as good faith, reasonableness or due diligence) are of vital importance for contractual interactions. The reference to the general clause of “principles of social coexistence” in the interpretative regime serves as a criterion according to which among a number of possible interpretation results one shall prefer the meaning of the contractual clause that proves to the highest degree in conformity

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with binding moral norms.\textsuperscript{70} Such objectivised interpretation involving the standard of accordance with moral norms is viewed in relation to the requirement of due diligence and so-called reasonableness test, assuming not only rationality of judgements but also a demand for honest and fair conduct.\textsuperscript{71} By contrast, it results exceedingly difficult to give effect to the above interpretative criteria within the operation of the smart contract source code compiler as the abstract concepts referred to in the aforementioned general clauses prove ineligible to be represented as an algorithm, and therefore untranslatable into a computer processable


\textsuperscript{69} Formerly, under art. 107 of the Code of Obligations the major interpretative criterion was the concept of good faith in an objective sense. Along with the rule of interpretation in conformity with usages of fair dealing it was perceived as an instrument to ensure a higher ethical standard of contractual transactions (cf. Longchamps de Bérier, R. (1938) Op. cit., pp. 138 et seq.). On the relevance of the categories of good faith and usages of fair dealing in key conceptual framework pertaining to the Code of Obligations, see: Matiko, R. (2016) Towards a Typology of Dimensions of the Continuity and Discontinuity of Law: The Perspective of Polish Private Law after the 1989 Transformation. Wrocław Review of Law, Administration and Economics, 6 (2), p. 114.

code. Furthermore, the criterion of contextual interpretation is of substantial importance. So-called situational context required to be taken into account by the interpreter encompasses external recognisable circumstances accompanying the performance of a declaration of intent. The aforementioned elements become increasingly relevant in consideration of the foregoing tendency towards adopting more flexible approach to perception of the *pacta sunt servanda* principle, under which the judge shall be expected to give wider attention to extra-contract elements when reconstructing the relevant sense of the agreement. In this regard, what shall be emphasised is the weightiness of context-dependent open-textured terms guaranteeing semantic flexibility characteristic of conventional contracts drafted in natural language. On the contrary, the possibility to reach compliance with open-textured standards in the sphere of smart contracts is generally eliminated as far as any contractual term ambiguity or purposeful vagueness are viewed as inefficiencies smart contract mechanism is called to remove. As another point of view, however, the line of reasoning aimed at demonstrating purported unambiguous

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nature of a smart contract coded in programming languages is contested since it is persuaded that instead of eliminating ambiguity smart contracts only disguise it, as the technical process of determining the semantics of any computer programme actually proves to be socially contingent.\(^\text{78}\) Moreover, the anonymity constituting a key feature of the mechanism underpinning smart contracts excludes the recourse to the interpretative criterion of commercial context when establishing the meaning of particular terms, hence substantially preventing their adequate implementation.\(^\text{79}\) Accordingly, automated (machine-driven) interpretation of algorithmised smart contract terms does not permit to achieve an appropriate objective contract law pursues to reach in order to establish the content of the contracting parties’ rights and obligations. What is more, as argued in critical research, in contrast to alleged smart contracts’ self-sufficiency in the sphere of interpretation, the prospect for surmounting the interpretative difficulties intrinsic to conventional contracts shall be denied.\(^\text{80}\) It seems therefore reasonable to exclude the eventuality of contractual interpretation being reduced to automated smart contract mechanism.\(^\text{81}\)

Given the above properties of smart contracts “self-interpretation” and the constraints ensuing from the use of programming languages, arguably in like manner the operation designed to establish the content of obligation stemming from the arrangement instantiated in smart contract results discomposed. Yet, as reported previously, the juridical scheme of determining the legal effects a contract is supposed to produce requires its content to be properly established in the interpretation process but also involves regard to general clauses, in this case performing the normative function.\(^\text{82}\) Consequently, the application of normatively required determinants regarding the due manner of the performance of contractual


obligation is to be excluded in the field of smart contracts. Thus, the obligation shall be performed in accordance with its content and in a manner consistent with its socio-economic purpose as well as with principles of social coexistence and if established customs exist in this respect, also consistent with these customs. It is argued that “auto-executability” perceived as a smart contracts’ distinctive feature corresponds to performance in a technological sense, and not in a contract law sense. Another issue necessitating further critical appraisal is the consequence of smart contract automated enforcement resulting virtually in – apparently misconceived – “absolutisation” of the pacta sunt servanda principle and, hence, purported elimination of the contract law remedies aimed at protecting the creditor. In substance, because of ineluctability of autonomous, algorithm-based implementation of the antecedently programmed action, the possibility that a smart contract be breached is supposed to be entirely excluded. It is thus maintained that the mechanism of smart contracts itself ensures unquestionable performance, rendering the variety of institutionalised remedies and securities unnecessary and pointless. Moreover, immutability of code claimed as an essential quality of blockchain-based smart contracts precludes – in principle – their adaptation in case of change of circumstances. The aforesaid characteristics attributed to smart contracts stand in contrast to the juridical output developed in the sphere of contractual obligations. Indeed, it is argued that contract law is defined


first and foremost by its remedial function and *ex post* intervention.\(^{89}\) What deserves particular emphasis in this respect is the universality of Roman law experience with regard to creditor’s remedies in the event of non-performance of obligation.\(^{90}\) On the contrary, the algorithm-driven operation of code involves *ex ante* determination of the whole course of transaction, which is expected to lead towards smart contracts’ self-sufficiency, calling into question the *ex post* adjudication model.\(^{91}\) This tends to imply a reversal of elementary functions ascribed to the law of contractual obligations.\(^{92}\) Further, it should be underlined that the requirement to honour contractual promises reflected in the *pacta sunt servanda* principle never operated as a principle being absolute in character.\(^{93}\) As mentioned previously, one of the vital exceptions to the *pacta sunt servanda* rule is the *rebus sic stantibus* clause recognised under Polish law. In these terms, the pursuit of efficiency and certainty of transactions to be achieved through unarguable execution of pre-defined terms encoded into a smart contract contradicts the need for flexibility which is met by the law of contractual obligations.

5. CONCLUSION

In the light of the above remarks, it shall be assumed that there are grounds to consider some aspects of so-called smart contracts in terms of private law constructs, however, with a number of reservations. Most of these follow from the incompatibility between the properties of the mechanism underlying smart contracts and the intrinsic value system pertaining to contract law. The main smart contracts’ inadequacy appears to amount to substantial dehumanisation of transactional process.\(^{94}\)

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Particular interdependencies individualised *supra* from the perspective of Polish law can be identified to an extent in regard to other legal systems, mainly those belonging to the continental legal tradition, given certain similarities among contract law frameworks in several aspects addressed within the scheme of the undertaken analysis. This is largely due to reception of essential Roman law principles relating to contractual obligations. Accordingly, what could be substantially viewed in a generalised manner as points of concern, are mainly the inconsistencies between the specificity of smart contracts and the methodology of contractual interpretation, the manner of determining the content of contractual obligation as well as the criteria of its due performance. Nonetheless, as already outlined, it is argued that a comparative overview of interpretative models and contract drafting techniques provides insight into why a higher degree of compatibility can be discerned between smart contracts model and common law framework than when confronted with the civil law one. Such an observation becomes all the more relevant as the influence of Anglo-American contract drafting style on both transnational and continental contractual practice is increasingly noticeable.

Innovative solutions arising from smart contracts infrastructure are only of limited application. The arguments that automated smart contracts will not constitute an alternative to traditional contracts, as they do not prove


capable of safeguarding the parties’ interests across all types of legal relations,\(^{100}\) must be concurred with. It seems unquestionable that their implementation in practice shall not result in replacement of the existing legal framework nor annulment of contract law as such. What can be found suggestive is the call for a deeper analysis on the instances requiring the blockchain-based algorithmic constructs to be “combined” with human-interpreted legal institutions, based on an arguable assumption regarding the predisposition to coexist for both the smart contracts mechanism and contracts in a juridical sense.\(^{101}\) However, any eventual form of such interaction, assuming but ancillary role of technological innovations, shall warrant respect for principles of the objective moral order reflected in the private law system as well as compliance with key functions contract law is expected to perform.\(^{102}\) It appears appropriate to note that the debate on smart contracts from the legal perspective and the attempt to explore their impact on contractual practice contribute to accentuating the functionality and operability of the main contract law precepts.\(^{103}\)

LIST OF REFERENCES


\(^{102}\) For more on main functions attributed to modern law of obligations, including the protective function, see i.a.: Radwański, Z. and Olejniczak, A. (2018) Op. cit., pp. 1–2.


