ANALELE ŞTIINŢIFICE ALE UNIVERSITĂŢII „ALEXANDRU IOAN CUZA” DIN IAŞI
TOMUL LXVII SUPLIMENT 2, ŞTIINȚE JURIDICE, 2021

DOI: 10.47743/jss-2021-67-4-8

Blockchain Technology and Electronic Wills

Tehnologia Blockchain şi testamentele electronice

Aniela-Flavia Ţicău-Suditu[1]

Abstract: In this study we examine the impact of information technology on inheritance law, especially in the context of drafting electronic wills. We consider it a subject of great importance, noting that, although we are unable to approach in a diverse manner the natural fact of death, we can personalize, according to our own expectations and principles, our way out of the scene. In this context, the certainty and predictability of the fulfillment of the last will dispositions are essential. Given that the writing of a traditional will has multiple limitations, we will analyze the manner in which technology offers the necessary mechanisms to fulfill exactly the dispositions of the last will. To this end, we will evaluate the implications of the Blockchain technology on the inheritance issue, examining both the shortcomings and the arguments underlying the implementation of the technology on a large scale.

Keywords: Blockchain technology; electronic wills; smart contracts; crypto-wills; inheritance law

Rezumat: În acest studiu examinăm impactul tehnologiei digitale asupra dreptului succesoral, în special în contextul redactării testamentelor electronice. Considerăm că este un subiect de mare importanţă, observând că, deşi nu suntem în măsură să abordăm într-un mod divers faptul natural al morţii, ne putem personaliza, în funcţie de propriile noastre aşteptări şi principii, ieşirea din scenă. În acest context, certitudinea şi predictibilitatea îndeplinirii dispoziţii de ultimă voinţă sunt esenţiale. Având în vedere că redactarea unui testament tradiţional are multiple limitări, vom analiza modul în care tehnologia oferă mecanismele necesare pentru a îndeplini, într-o manieră cât mai fidelă, dispoziţiile de ultimă voinţă. În acest scop, vom evalua implicaţiile tehnologiei de tip „Blockchain” în context succesoral, examinând atât deficienţele, cât şi argumentele care stau la baza implementării tehnologiei pe scară largă.

Cuvinte-cheie: tehnologia de tip Blockchain; testamente electronice; dreptul de moştenire; contracte inteligente; testamente crypto

[1] Judecător, doctorand, Academia de Studii Economice din Bucureşti, e-mail: aniela.suditu@yahoo.com.

1. Short presentation of several technologies applicable for drafting wills

Since the purpose of the legislator is to rule in an efficient manner, the tools and the legislative context must be provided in order for the law recipients to exercise accordingly their rights. In the context of succession law, *de cuius* ought to have the legal instruments to draw up a valid will.

But so far, most legislations had not regulated the electronic will hypothesis, although plenty of them have the legislative framework applicable in the digital context, for example different regulations on electronic commerce, respectively legislation on electronic signature. Obviously, there is a discrepancy within the legislative landscape. Consequently, the types of wills currently stipulated in various legislations, should be integrated, in a functional way, in a digitalized context.

It is an undeniable fact that a major part of our economy involves the digital medium. In order for it to properly function, there are centralized databases used for the interchange of digital content. Even though at a first glance it appears to be a positive feature, the centralized databases present themselves with plenty shortcomings, such as increased exposure for internet fraud or hacking maneuvers.

For the groundwork of electronic wills, several technologies have been proposed. Among them, the '*Hash*' technology, that has the objective of ensuring the digital identification of the documents. This involves a cryptographic process that can be used to certify the authenticity and validity of documents, by assigning unique characteristics to each file, using calculation algorithms. As a result, if the document is accessed, modified or copied, the algorithm indicates a new hashing value, making the document history transparent.

Another process consists in using metadata as structural information on data and presenting in detail the characteristics of some files, indicating by multiple coordinates the properties of a document.

An alternative option, the blockchain technology, is a decentralized digital register of data deposited in a network that allows them to be encrypted. Nakamoto proposed in his white paper[2] the concept of '*block chain'*, a centralized ledger system for a '*framework of coins made from digital signatures'*. Blockchain technology exchanged the conventional, centralized databases with a decentralized storing mechanism, in which the digital data can be reorganized in basic units, entitled blocks.

Blockchain technology involves decentralized, encrypted and distributed network transaction system, originally used for creating bitcoin, as an alternative to a centralized transaction system, considered cost-inefficient due to the numerous taxes and intermediaries involved. For the purposes of creating crypto wills, another technology proved appropriate, respectively the Ethereum blockchain platform, that enables smart contracts in order to execute automatically

[2] Nakamoto, Satoshi, *'Bitcoin: A Peer-to-Peer Electronic Cash System', 2009,* [Online] at https://bitcoin.org/bitcoin.pdf, accessed on 26.11.2021.

different types of rights and obligations, that are the object of miscellaneous contracts or unilateral acts. Blockchain is therefore a technology that allows the development of smart contracts. These contracts are in fact agreements that are executed automatically, through a specially designated software, the mechanism allowing the automatic management of the assets listed within the platform.

2. Steps for drawing up an electronic will via blockchain

Creating an electronic will by using Blockchain technology involves a few simple steps. To begin with, *de cuius* nominates a key custodian, whose task is to inform the system in case of the testator's death. The key custodian has to update the system of his approval regarding the task of notifying the testator's death. Even though designating a key custodian is believed to be optional, considering that the beneficiaries enlisted in the blockchain could perform the same function, it would be highly advisable, mainly due to the lack of conflict of interests.

The key custodian has two main tasks. Firstly, he has to inform the network of the death of *de cuius*, generally by adding into the blockchain the death certificate. Secondly, he has to forward the blockchain will either to a designated representative, to the competent court or to a public notary, respectively to the administrative institutions involved.

Next, after designating the key custodian, the testator records both beneficiaries and assets in the network. Afterwards, users are linked to different crypto addresses to secure the data. Users also provide details on the distribution of assets. Access to the platform could therefore be achieved by creating an account by the testator, and the validity conditions could be verified in real time by an algorithm. The will could be updated at any time and signed electronically, and the custodian platform would be its depositor in a blockchain system that would ensure a high degree of security and evidentiary facilities. Even if the content is private, any data change would automatically be flagged by the system, in order to secure the input data. In this process, it would not be necessary to appoint witnesses, lawyers or executors, since the will of the testator, as specified into the blockchain, will be executed.

Therefore, in the blockchain version, it could be used a custodian-platform recognized or approved by the state, thus vested with public power, and the proof of the validity of the will could be carried out by the notary public who would proceed with the successional execution.

However, the custodian-platform could also act as an e-will executor, verifying the inheritance options and, subsequently, proceeding directly to the transfer of the inheritance rights and obligations to the estates of the acquiring individuals, according to a well-predefined algorithm. Also, the testator can add in the blockchain a notary or witnesses that can testify[3] the testator's free will and lack of undue influence in drafting the will.

[3] This can be done by using a crypto key assigned by the testator.

On the blockchain, everything could be anonymized, including the will itself or the terms of the will, the identities of all the individuals enlisted in the blockchain, respectively the testator, the key custodian, the notary, the witnesses and the beneficiaries. The feature of anonymity is achievable from a security point of view, due to the fact that each block of the chain has imprinted in it the time of its configuration, and this information is disseminated to all nodes.

3. Comparison between traditional wills and crypto wills

It is a constantly accepted fact that drawing up wills presents various challenges, both physical and psychological, internal and external. For example, traditional holographical wills can easily be forged, hidden, destroyed or lost. They can also be misinterpreted or invalidated. Obviously, these weaknesses can and should be reduced by using the appropriate methods, such as a secure technology. First of all, the simple step of storing the will on a digitalized medium, no matter the format of encryption, provides additional assurances for the validity of the Electronic Will[4]. The feature of adjusting the will accordingly, following the user's wishes, indicates a solid advantage of the electronic will, noting that it is straightforwardly accomplished.

Without a doubt, the option of registering a will within a digitalized medium presents itself in a darker shade in case of hacking, of private information counterfeit or in the context of another type of internet fraud. Nevertheless, this can be avoided either by raising digital security, by having a hardcopy of the e-will or by accessing a technology that is better fitted for this type of legal aspect. Blockchain technology is in fact a digital register of data which is deposited on a network that enables both data encryption and the elaboration of smart contracts[5].

One particular advantage of the distributed network feature is the fact that copies of the Will are spread on various nodes. As a consequence, it would be fairly easy to detect any inconsistency between those copies, that could eventually be labeled as untrustworthy. Therefore, due to the mechanisms that it involves,

[4] We used the term 'electronic will' or 'e-will' for wills registered within a digitalized medium, and the term 'crypto will' or 'blockchain will' for a specific type of electronic will, that are registered using the blockchain technology.

[5] For a more developed scheme of Crypto-Will steps, see: Crawford, Bridget J., *Blockchain Wills*, 95 Indiana Law Journal 735 (2020), [Online] at https://ssrn.com/abstract=3346493, accessed on 26.11.2021.

The author outlines seven steps, as it follows: will coding and listing of assets and of beneficiaries, securing individuals through crypto addresses, linking through smart contracts all the third parties involved, including the financial institutions and the administrative ones; linking the will to the official records (such as death, marriage and birth databases, hospital records, etc.) and to a software that verifies the status quo of the testator, in order to double-screen his existence, automatically flagging changes of the will and, finally, automatically executing the contract through smart contracts technology, after the testator's death.

Blockchain technology is considered 'un-hackable', this feature rendering the desirability for storing data content.

Another issue ready to be solved by applying the blockchain technology in the testamentary succession legislation consists in reducing the incidence of unclaimed inheritances[6], due to the automatic execution of the will. As described in the legal literature, integrating unclaimed inheritance is a legal issue with surprisingly many repercussions, such as affecting the micro and macro-economy by not distributing the assets to the rightful beneficiaries, that leads to underdevelopment, abandonment and inequality. As a consequence, family disagreements on inheritance issues would be reduced to a minimum.

As we pointed out throughout this article, the Crypto Will has plentiful advantages in comparison to the Traditional Will[7]. Therefore, a will system based on the blockchain technology, combined with the smart contract technology, offers the best of the two digital worlds. Blockchain technology provides a chain of assets and individuals that are linked to blocks. Simultaneously, the smart contract feature enables the automatic allocation of assets to the designated individuals. The Blockchain system allows the precise recording and managing of different types of transactions or contracts, with limited or no need at all for third parties.

Though is a cost-effective technology, some argue that the Blockchain system might enhance the tax evasion and auditing[8], compared to the traditional will. Consequently, cryptocurrency in general[9] and Bitcoin, in particular, including the technology it is founded on, blockchain, are considered befitting for criminal activity[10], due to the lack of publicity and the decentralized feature of digital ledger of transactions.

From the perspective of the costs involved, the crypto will proves to be by far more accessible than the traditional will drafted by the public notary or by the attorney at law. In the legal literature, there were proposed different algorithms for calculating the cost analysis of registering and executing a will. We will exemplify

[6] Wan Nur Izzah Wan Muhamad Fokri, Engku Muhammad Tajuddin Engku Ali, Nadhirah Nordin, Wan Mohd Yusof Wan Chik, Sumayyah Abdul Aziz, Ahmad Jazlan Mat Jusoh, *The Unclaimed Inheitance Issues: a solution using Blockchain Technology*, Psychology and Education, 2021), [Online] at https://pdfs.semanticscholar.org/3dcd/9ceac044a29b8817deb9ae487b1ebefe3d61.pdf, accessed on 26.11.2021.

[7] For a broader perspective, in another article we examined, in a more detailed manner, the pros and cons of two type of wills: Electronical wills and the traditional ones: Ticau-Suditu Aniela-Flavia, Silvia Uscov, *Testamentul electronic*, Curierul Judiciar, nr. 5/2021.

[8] Walaa J. Alharthi, *Using Blockchain in WAQF, Wills and Inheritance Solutions in the Islamic System*, International Journal of Economics and Business Administration Volume IX, Issue 2, 2021 pp. 101-116.

[9] Ethereum, Dash, Litecoin, Ripple and others.

[10] See also, Shih, T.F.; Chen, C.L.; Syu, B.Y.; Deng, Y.Y. *A Cloud-Based Crime Reporting System with Identity Protection.* Symmetry 2019, pp. 255.

one such algorithm[11]. The variables considered for calculating the total amount necessary imply: the will editing, the issuing of the death certificate, the distribution of the assets enlisted in the blockchain, and the technical solutions employed, respectively the multiplication operation, the comparison operation, the hash function operation and the signature operation. To wrap it up, the authors concluded that the total communication cost was of 1280 bits, which denotes a very small rate. Therefore, the cost efficiency feature renders the blockchain technology extremely appealing.

As a consequence, making a crypto will turns out to be an accessible endeavor, pointing towards the versatile, digital limits that keep reducing themselves in order to offer the involved users a boundless experience. Drawing up a blockchain electronic will would not only be comfortable, but would also provide security guarantees.

It is an obvious fact that the formalities stipulated for the making of a traditional will, are no longer able to accomplish the purposes for which they were postulated. As a conclusion, Blockchain technology can achieve the equilibrium between maintaining the traditional wills formalities' rationale and updating the legislation to a digitalized context, suitable for our lifetime.

4. The blockchain applied to wills

Generally, the legislations that have provisions regarding electronic wills, have three common conditions. The requirement of a will drafted in a digital format and stored on a digital medium, that presents the digital or electronic signatures of the testator and witnesses. These formalities are followed by another one, that concerns the actual manner of communication, enabling the testator and witnesses, or, when needed, public notaries, to be connected through audio-visual technology, even though physically separated[12].

In this context, the '*proof of existence'* element has the same purpose as a public notary, therefore establishing not only the data ownership but also assessing the integrity and validity of the analyzed documents. It is obvious that there are plenty advantages both for the testator and for the beneficiaries in the context of creating and executing an electronic will. Additionally, having the same purpose with the electronic will stored on a regular digital platform, the crypto will, stored within a blockchain, presents plenty advantages, as examined throughout this paper, derived in particular from the distributed network structure. Therefore, it involves a will administration designed as an '*end-to-end process'*, with its main features: cryptographic, static and with a software which is both distributed and decentralized.

[11] Chen, C.-L.; Lin, C.-Y.; Chiang, M.-L.; Deng, Y.-Y.; Chen, P.; Chiu, Y.-J. *A Traceable Online Will System Based on Blockchain and Smart Contract Technology*. Symmetry 2021, 13, 466, https://doi.org/10.3390/sym13030466, accessed on 26.11.2021.

[12] Crawford Bridget J., *Blockchain Wills* (February 22, 2019). 95 Indiana Law Journal 735 (2020), [Online] at https://ssrn.com/abstract=3346493, accessed on 26.11.2021.

Even though the individuals enlisted within the Blockchain are aware about the drafted Will, they cannot open it, being a private document, accessible only by the testator' crypto address, as long as he is alive. At the moment of his demise, the will is automatically accessible to the beneficiaries. Moreover, due to its feature of being a smart contract, the will can be executed automatically.

Another interesting aspect is that only the beneficiaries can decode the addresses. As a consequence, any alteration of the Will can be observed by the individuals enlisted, who will be alerted about the action and its coordinates: time, location and crypto-address. Nevertheless, the identity of the beneficiaries is unknown to the others[13], thus reassuring the testator of the private nature of the will.

5. Using smart contracts in drawing up wills

A smart contract is an agreement based on a specifically allocated software, characterized by the automatic execution of both rights and obligations. Specifically, smart contracts[14] are self-executing, transparent, customized and accessible. They can verify and execute the provisions drafted within the will, automatically transferring the estate to the designated beneficiaries. Smart contracts[15] are distributed on networks, in order to execute different types of transactions, in case of meeting the contractual terms[16].

The option of drafting a custom-made smart contract generates the premises of an efficient and easy execution of the Will. Because it facilitates the transfer of both real and digital assets[17], drafting a crypto-will is an optimal solution specifically for the testators involved in cryptocurrency transactions, such as bitcoin or Ethereum, enabling the beneficiaries to access the testator's accounts, thus preventing the losing of various types of digital assets.

As a consequence, in this context, a smart contract consists of a mechanism specially designed in the purpose of enabling the immediate execution and

[13] Noting that every single user is given an encrypted digital signature that it is not fitting to lead towards the identification of the user linked with an elected pseudonym.

[14] See also, Buterin V., *A next-generation smart contract and decentralized application platform.* White Paper 2014, 3, 1–36; Wang, S, Ouyang L., Yuan Y., Ni X., Han, X, Wang F.Y., *Blockchain-enabled smart contracts: Architecture, applications, and future trends*, IEEE Transact. Syst. Man Cybern. Syst. 2019, 49, 2266–2277, [Online] at https://blockchainlab.com/pdf/Ethereum_white_paper-a_next_generation_smart_contract_and_decentralized_application_platform-vitalik-buterin.pdf, accessed on 26.11.2021.

[15] Also called digital contracts or blockchain contracts.

[16] Sreehari P., Nandakishore M., Krishna G., Jacob J. and Shibu V. S.,*'Smart will converting the legal testament into a smart contract'*, *International Conference on Networks & Advances in Computational Technologies , NetACT*, 2017, pp. 203-207.

[17] For a perspective regarding digital assets, see Ticau-Suditu A.F., '*Digital Legacy'*, Analele Ştiinţifice Ale Universităţii Alexandru Ioan Cuza Din Iaşi, Ştiinte Juridice, vol. 3/2020, [Online] at https://heinonline.org/HOL/LandingPage?handle=hein.journals/anuaiclaw66&div=54&id=&page=, accessed on 26.11.2021.

administration of the wills and deceased' estates, following their registration within the blockchain. Accordingly, both the will itself and its content would be private, enabling only the author and its beneficiaries to access its content, due to the distinctive crypto-addresses. After the entry of the testator's death into the blockchain, the registered will is executed automatically, according to its provisions, and the role of third parties or intermediaries is either reduced or even eliminated.

6. Blockchain application

Many developers saw the potential in this technology, either through the management of bitcoin cryptocurrencies or via the use of smart contracts[18] or data science and cyber security[19]. The blockchain technology has a strong social impact and it is employed for educational or charity purposes, including by UNICEF[20], by different egalitarianist movements[21], or even by governments[22] for achieving various purposes[23].

In the legal field, the potential of smart contracts technology finds itself at a pioneering stage. Many developers offer solutions for replacing lawyers or even courts, offering the users alternatives to the traditional methods for solving cases. Such examples are the platforms *donotpay.co.uk,* that provide free legal expertise for general users, *jury.online.com,* that can be accessed by agreeing users and

[18] Di Pierro M., '*What Is the Blockchain'* in Computing in Science & Engineering, vol. 19, no. 05, pp. 92-95, 2017, [Online] at https://doi.ieeecomputersociety.org/10.1109/MCSE.2017.3421554, accessed on 26.11.2021.

[19] B. Thuraisingham, *'Blockchain Technologies and Their Applications in Data Science and Cyber Security'*, in 2020 3rd International Conference on Smart BlockChain, Zhengzhou, China, 2020 pp. 1-4.

[20] The agency launched a general invitation to help the Syrian children by crypto transactions, labeling it as '*the first humanitarian fundraising campaign',* see more, Mathias Roumy, UNICEF – Game Chaingers, *MakeMePulse,* [Online] at https://m.makemepulse.com/unicef-game-chaingers-41802cfa0b3c, accessed on 26.11.2021.

[21] See for example, https://cryptochicks.ca; https://hackernoon.com/make-way-for-the-crypto-queens-4945df6d33f, https://www.inc.com/zoe-henry/lgbt-community-launches-cryptocurrency.html, accessed on 26.11.2021.

[22] For example, see Neuberger J.D., Wai L. Choy & Dodge T. M., *Modernizing Real Estate Records with Blockchain*, THE NAT'L L.F. (2018), [Online] at https:// nationallawforum.com/2018/06/30/modernizing-real-estate-records-with-blockchain, accessed on 26.11.2021, the authors concluding that '*blockchain has the potential to improve upon problems that hamper deed recording systems in the United States today'.*

[23] For example, the Blockchain Apparatus, is an application based on blockchain technology, that uses the content data registered on an official database, such as US Social Security Administration, that gives access to the Death Master File. This application enables the possibility of a crypto will that can be executed automatically via smart contracts technology.

provides a jury that can decide small claims matters, for a minimum cost[24], and the Zweispace platform[25], having as an objective the implementation of a self-executing will system by automatically distributing an estate assets to the beneficiaries.

Even though wills are not contracts, being defined by their unilateral character, due to the fact that it involves the will of only one party, they can be executed through a blockchain - smart contracts platform. Consequently, most of the challenges encountered while executing a traditional, paper will, can be addressed through the technology employed. For example, in case of estate execution disagreements or arguments related to the will, there are plenty of applications within the Blockchain that could offer solutions, by accessing a special designed mechanism involving dispute resolution.

The legal literature concerning the blockchain technology projected a number of functional systems involving crypto wills. One such system[26] envisions the following structure: a Blockchain Center (where the will is drafted and registered by the testator, who also provides relevant data, such as personal information, passwords, accounts and other private information; the blockchain center verifies the input data, encrypting it and assigning a key and secured addresses), an applicant (the testator), beneficiaries or family (in this case, the testamentary successors; this could also include the interested parties), a competent court (in case of will applications; according to national legislations, a public notary and witnesses can be enlisted into the blockchain, with the same purpose), a hospital (issues the testator's death certificate). As we mentioned before, the applicant can also enlist into the blockchain key custodians, witnesses or public notaries, in order for a smoother execution of the will.

The impact of implementing blockchain technology in succession law, form a macro economical perspective is also analyzed by different authors. One author[27] identifies the following: reducing strict bureaucracy, enhancing transactional transparency due to the better managing the records kept via Blockchain; decreasing the corruption due to the transparency, distribution feature, the security guarantees it presents and the low costs it involves, enabling the crowdfunding for development[28] by the facility of collecting small contributions,

[24] [Online] at https://venturebeat.com/2017/10/23/jury-online-wants-to-replace-lawyers-with-blockchain-technology/, https://venturebeat.com/2017/07/12/donotpay-expands-its-free-legal-services-across-u-s-and-u-k/, accessed on 26.11.2021.

[25] [Online] at https://www.cbinsights.com/company/zweispace, accessed on 26.11.2021.

[26] Chen C.-L., Lin C.-Y., Chiang M.-L., Deng Y.-Y., Chen, P., Chiu, Y.-J., *A Traceable Online Will System Based on Blockchain and Smart Contract Technology*. Symmetry 2021, 13, 466, https://doi.org/10.3390/sym13030466, accessed on 26.11.2021.

[27] Alharthi W.J., *Using Blockchain in WAQF, Wills and Inheritance Solutions in the Islamic System*, International Journal of Economics and Business Administration Volume IX, Issue 2, 2021 pp. 101-116.

[28] See also, Zhu H. and Zhou Z. Z., '*Analysis and outlook of applications of blockchain technology to equity crowdfunding in China'*, Financial innovation, vol. 2, no. 1, p. 29, 2016.

in order to enable the founding of a major project, enhancing an ecosystem of integrated property development that could support sustainable projects, due to an inclusive system that is enabled by the blockchain technology.

7. Conclusion

Throughout this article, we outlined the importance of bringing up-to-date the legal and regulatory framework in the succession law context, in order to take advantage of the Blockchain mechanism. Our assessment on Blockchain wills convinced us that they would be more secure, easier to conclude and would display a higher rate of validity in contrast with the traditional, paper wills.

As a corollary, the option for drafting electronic wills via blockchain technology would benefit both the decedent and successors of the estate, enabling to preclude legal arguments, as it is easier to avoid the wills' misinterpretations, knowing that the Blockchain technology provides for a will that is not only unique, unalterable, secure and irreversible, but is a digital versatile object, that can be multipurposed and personalized, offering a plenary experience to composing a will, a life's last expression, in a most humane display.

Plenty concerns regarding the blockchain wills are still to be addressed so that various national legislations would be able to implement the technology. Therefore, the harmonization with the current legal framework is crucial. Nevertheless, the system could be adjusted in order to fully satisfy the present rules, bearing in mind that the obstacles for implementing the technology are mainly of an administrative nature, and not of a substantial one. For example, testators, public notaries or key custodian could attest in advance their identity, in order to facilitate the judicial successional procedure. We consider that the best way to make legal provisions regarding the use of the blockchain technology would be through a multinational regulation, for instance, the EU Regulations, that would act as a catalyst for implementing a more innovative legal approach.

Nevertheless, creating legal provisions for crypto wills is essentially a matter of society's vision. In the context of valuing the freedom of disposition above abiding the will's traditional formalities, and interpreting the law in order to be effective rather than fixed, it is an obvious choice the enacting of crypto-wills. For these reasons, we consider it necessary and opportune for the legislator to be proactive in the context of the electronic will regulations, and specifically for crypto wills, by stipulating the option of using blockchain technology as appropriate with the context of digitalization.

References

Buterin, V., *A next-generation smart contract and decentralized application platform.* White Paper 2014

Chen C.-L., Lin C.-Y., Chiang M.-L., Deng Y.-Y., Chen, P., Chiu, Y.-J., *A Traceable Online Will System Based on Blockchain and Smart Contract Technology.* Symmetry 2021, 13, 466, https://doi.org/10.3390/sym13030466

Crawford B.J., *Blockchain Wills*, 95 Indiana Law Journal 735 (2020)

Zhu H. and Zhou Z. Z., '*Analysis and outlook of applications of blockchain technology to equity crowdfunding in China*', Financial innovation, vol. 2, no. 1, 2016

Nakamoto, S., *'Bitcoin: A Peer-to-Peer Electronic Cash System'*, 2009

Neuberger, Jeffrey D., Wai L. Choy & Trevor M. Dodge, *Modernizing Real Estate Records with Blockchain*, THE NAT'L L.F. (2018)

Pierro, M. Di '*What Is the Blockchain'* in Computing in Science & Engineering, vol. 19, no. 05, 2017, https://doi.ieeecomputersociety.org/10.1109/MCSE.2017.3421554

Sreehari P., Nandakishore M., Krishna G., Jacob J. and Shibu S., *'Smart will converting the legal testament into a smart contract'*, *International Conference on Networks & Advances in Computational Technologies , NetACT*, 2017

Shih T.F., Chen C.L., Syu, B.Y., Deng Y.Y., *A Cloud-Based Crime Reporting System with Identity Protection.* Symmetry 2019

Ticau-Suditu A.F., '*Digital Legacy'*, Analele Ştiinţifice Ale Universităţi Alexandru Ioan Cuza Din Iaşi, Ştiinte Juridice, vol. 3/2020

Ticau-Suditu A.-Fl., Uscov S., '*Testamentul electronic'*, Curierul Judiciar, nr. 5/2021

Thuraisingham, B., *'Blockchain Technologies and Their Applications in Data Science and Cyber Security'*, in 2020 3rd International Conference on Smart BlockChain, Zhengzhou, China, 2020

Walaa J. Alharthi, *Using Blockchain in WAQF, Wills and Inheritance Solutions in the Islamic System*, International Journal of Economics and Business Administration Volume IX, Issue 2, 2021

Wan Nur Izzah Wan Muhamad Fokri, Engku Muhammad Tajuddin Engku Ali, Nadhirah Nordin, Wan Mohd Yusof Wan Chik, Sumayyah Abdul Aziz, Ahmad Jazlan Mat Jusoh, *The Unclaimed Inheitance Issues: a solution using Blockchain Technology,* Psychology and Education, 2021

Wang S., Ouyang L., Yuan Y., Ni, X., Han X., Wang F.Y., *Blockchain-enabled smart contracts: Architecture, applications, and future trends*, IEEE Transact. Syst. Man Cybern. Syst. 2019