USING BLOCKCHAIN TECHNOLOGY IN THE SPHERE OF LABOR

Lutsenko Olena

DOI: https://doi.org/10.61345/1339-7915.2025.1.8

Annotation. *The aim of the work* is to study the integration of blockchain technology into the scope of labor law, emphasizing its potential to increase transparency, efficiency, and safety in labor relations. In the digitalization era, traditional labor law approaches face significant problems, including the need to improve the processes of inspection and improved mechanisms for the protection of employees and employers. This study presents a critical analysis of how blockchain can solve these challenges with the help of decentralized systems that facilitate confidence and traceability in employment contracts, the procedure for payment of wages and recruitment.

The methodological basis of the study involves a comprehensive review of the literature and thematic studies of blockchain in the context of labor law. The author involved a plethora of scientific methods, such as methods of analysis and synthesis when finding out scientific positions and approaches in blockchain research; The dialectic method that allowed to establish relationships in the field of work and blockchain technology. The inductive method is involved in the analysis of individual stages of the use of blockchain during labor relations. The deduction method was useful when analyzing the procedure for hiring an employee with the help of a blockchain. The method of comparative studies was used in the comparative aspects of the European experience in the use of blockchain in the field of work.

The results of the analysis show that blockchain can significantly improve the checking of employment contracts, reduce the risks of wage violations, and streamline compliance with the rules of work. Moreover, previous conclusions suggest that adopting reasonable contracts can automate different processes, thus reducing employers' rights. In addition, the study also refers to obstacles, such as regulatory gaps and the need for national standards that should be decided to facilitate widespread adoption.

In conclusion, the study emphasizes the transformation potential of blockchain technology in labor law. By promoting greater transparency and efficiency, Blockchain provides a valuable opportunity to rethink labor relations in digital technology. The author offers her vision of the introduction of blockchain technology during the emergence of labor relationships, which will promote the protection of both the rights of employees and the proper level of monitoring the level of providing employers in the field of work in the field of work.

Key words: scope of labor law, digital technology, blockchain, smart contracts, labor relations, employee, employer.

1. Introduction.

In the rapidly evolving landscape of digital technology, blockchain has emerged as a transformative force with the potential to redefine traditional business operations across various sectors. Originally conceived as the underlying technology for cryptocurrencies, blockchain's decentralized and secure nature has sparked interest in its applicability beyond financial transactions.

In recent years, blockchain technology has become a transformative force in various industries, promising increased security, transparency, and efficiency in data and transaction management. The potential applications of blockchain in the labor sector are attracting increasing attention from

researchers and practitioners. The integration of blockchain into labor-related processes offers numerous opportunities, including secure and immutable employment records, simplified payroll systems, automated smart contracts for employment agreements, and enhanced verification of professional credentials. These applications have the potential to significantly reduce fraud, increase trust between employers and employees, and improve overall workforce management efficiency.

That is why it is significant to explore the potential benefits and challenges of blockchain applications in labor and employment law, as well as to suggest future directions for further research and development. As the global workforce continues to evolve in the face of technological advances and a changing economic landscape, understanding the role of blockchain in shaping the future of work is becoming increasingly important. By decentralizing data management and offering immutable record-keeping, blockchain promises to address critical challenges in labor markets, such as data integrity, contract management, and worker participation. Through a comprehensive analysis of current implementations and future possibilities, thus, this study aims to shed light on the potential of blockchain to not only optimize labor practices but also to usher in a new era of efficiency and equity in employment relationships. This research contributes to the growing body of knowledge about the intersection of blockchain technology and labor practices, offering a framework for further research and innovation in this rapidly evolving field.

2. Analysis of scientific publications.

Unfortunately, blockchain has not yet been studied much, only scholars in the fields of civil, tax, and land law focus their research on this topic, but labor scholars still have little experience in this area, and only a few scholars in the field of labor law are beginning to be interested in blockchain technology, in particular, L. Ostapenko, S. Andrushko, A. Kuz [1], O. Sereda [2]. Therefore, in order to establish a new approach to define the scope of labor law, it is important to comprehend the essence and possible ways of using blockchain to update the scope of labor law.

3. The aim of the work.

The purpose of this article is to reveal some foreign approaches to the use of blockchain in labor and employment matters and to highlight the author's proposal on the possible use of blockchain technology for the emergence of labor relations to expand the scope of labor law and extend it to the newest types of activities and professions.

4. Review and discussion.

Blockchain technology is a digital concept for storing data, developed to solve the issue of how two parties, without knowing or trusting each other, could conduct an online transaction without having to rely on a middleman to act as a trusted third-party intermediary [3, c. 327].

The main idea behind the concept is to simultaneously *decentralize* and *secure trust* between parties looking to perform a transaction. It is a distributed digital ledger system that holds information about transactions having taken place in a register that is transparent, accessible and once the information has been entered, formed into an immutable "block", meaning it cannot be altered. This process continues as additional data is available and transactions are completed and new blocks are added to the existing blocks, creating a chain [4].

The blockchain concept stands in contrast to the present procedure, where in traditional databases, the information is held by a central party, and many transactions are carried out using middlemen keeping ledgers of transactions and acting as proxies for trust and information. The current setup of handling information is opaque, costly and inefficient, making the process slow, and excessively reliant on middlemen and paperwork to ensure that the information is correct and appropriate. Since the physical investments needed to add actors to an existing blockchain are small (access

to a smartphone or computer is all that is needed), it offers a solution by both making the current process more efficient and transparent, but also by enabling more information to be made available regarding a certain product or process. In addition, the simplicity of the blockchain enables the storage of information that can be used as checks and balances for the information entered, such as empowering workers by making them identifiable actors on their own or having ILO representatives enter information regarding the adherence regulations to working conditions [4].

There is a common understanding that blockchain technology and its applications are slowly becoming part of more and more employers' "toolkit" concerning employment contracts, especially because of the advantages which Distributed Ledger Technology, such as immutability and immediacy offer. Nevertheless, this phenomenon should be approached critically and from a legal perspective, since violation of employees' rights is feasible [5].

Initially, an EU legislative act will be used as a reference point; Article 4 of Directive 91/533/EEC on the provision of written employment contracts and, particularly, the information on the main terms of the employment relationship which must be provided to employees by every employer in the EU, for instance way of payment, working-hours, duties, wage amount. Despite all Member State's obligations to achieve – with their laws – the goal set by the EU, under some specific circumstances employment relationships are not concluded in written form [6]. However, in Bulgaria, the Czech Republic, Denmark, Estonia, Greece, Italy, Latvia, Lithuania, Romania, Slovakia and Sweden, employment contracts are compulsorily in written form. Some examples of national laws on the legal requirement of written employment contracts are *The Act on Employment Certificates* (Denmark), *Presidential Decrees 181/2003* and *16/2004* (for fixed-term work in private and public sector in Greece), *The Swedish Employment Protection Act* (Sweden) and the Romanian modified *Labour Code*, according to which an employment contract can only be concluded in writing, with an oral contract being null and void.

In these grounds, two are the main elements that light should be shed on; Firstly, on the Directive's and national laws' requirement of written employment contract and secondly on the nature of Smart Contract. As a result, the use of a Smart Contract should not in any case replace the written legally required employment contract, which provides the employee with certainty, security and protection (ILO, 2013) [7].

The aforementioned triptych creates a new question. To what extent the use of a Smart Contract can offer certainty, security and protection to each party, meaning the employer from the one hand and the employee from the other hand? Using a Smart Contract in an employment contract entails inter alia that not only payment can become part of an automated execution process, but also that working-time can be pre-defined, which mean that, in principle, both parties are ensured, concerning these important terms of the established employment relationship.

One of the most common ways of wage's calculation is time. Additionally, there are five forms of (variable) payment for EU employees [8], which are by results (i.e. the number of manufactured products), ii. by individual performance (i.e. by percentage of sales made by the employee), iii. by group performance, iv. according to a profit-sharing scheme and v. according to a share-ownership scheme. These forms of wage calculation can have a meaning in the process of a Smart Contract's coding, serving as the specific conditions, which should be met in order for the protocol's execution – e.g. concerning payment – to start. For example, the employer, before starting the process of payment, can check through an automated process whether the employee has fulfilled his obligation [9]. It should be noted that, since the employer is the one who bares the business' risk, if the calculation of wage gives a result lower than the legal minimum wage, then this result should be complemented until the wage – which is about to be paid- reaches the legal minimum amount. Similarly, the above-mentioned mechanism could be coded to form a Smart Contract's execution part. Employee's protection can be ensured, if the following are taken into consideration; firstly, in a Smart Contract's framework the next step is not only named but executed by the protocol-software as well and secondly its proper execution is ensured due to blockchain [10]. In that way, many trials could be avoided, in case of an employee's rights' infringement. The amount of remuneration is legally set by each Member State, meaning that either there is a statutory minimum wage or minimum wage is the subject of collective agreement [11].

Most importantly, wage is also protected by Article 31 of The EU Charter, which is another source of European Labour Law, as previously stated. In particular, despite the fact that wage is not part of the EU Charter's written text, it is included in the concept of dignity. Correct interpretation of the term "dignity" requires the inclusion of wage, since it is regarded as a traditional labour law's concern [12].

In my opinion, for the use of blockchains to expand the scope of labor law, we model labor relations as a system of legally significant actions, taking into account the need for legal recognition and authorization. The initial state for the formation and use of blockchain technology during employment is a "state of rest", that is, the system (platform) is ready for the "creation" of new labor relations. The first event in the algorithm is called "New Employment Proposal" and is to create a new job offer. This happens when the employer completes the procedure for creating a platform proposal. In particular, the employer uses the interface provided by the platform to determine all the properties of the new vacancy: the content of the work function, the name of the position, the requirements for the employee, the number of working hours, the payment of time, etc. In addition, the employer deposits the amount of digital assets to cover the value of wages. When done, the platform creates and sends a ready-made message to the blockchain, which contains all the information necessary to create a set of smart contracts (SC) by which the system will control the employment relationship.

The event of a new job proposal changes the state from the initial state to the "standing state of applicants". In this condition, the platform is set to accept new employees and potential employees may apply for an open vacancy. In this condition, the platform shows employees to work. The internal event program describes when the employee applies for a job offer. The employee must send a message message-a smart contract, which is responsible for receiving the request of the program, as well as for calculating and returning the applicant's employee to the employee.

When a sample worker (a platform selected as one who meets all the requirements of the algorithm) meets with an employer who can activate the state of "employment" – the next state on the platform. In this case, the employer already has the applicant's ID and sends a blockchain message to start a work relationship. Now the system goes into the "state of relations". In this condition, the employee can check all his "working situation" and the number of hours worked. The Working Day with an internal event describes the daily number of working hours and occurs when the employer sends a blockchain message to confirm that the employee has completed the working day. Automatically, when the working time ends, the smart contract "announces" the reporting period of the labor relationship and there is an event "payment", during which the system so to speak "moves" the salary contributed by the employer to the employee's account. As a result, this event goes to the state of completion during the reporting period, and then the consensus algorithm begins again and again.

Thus, the blockchain will identify employers and employees, register all employment relationships, control and calculate the development of labor relations, and finally calculate and "transfer" wages from employers to employees. All these actions will be performed by using decentralized computer programs called "smart contracts". The platform operates through a decentralized system of three typologies of smart contracts: SC-deposit, SC-application and SC relationship. All these three typologies of smart contracts in the platform system will be recorded to create and automate new labor relations. According to the system of states described above, the platform will customize three smart contracts with the data description data provided by the employer. In other words, during the proposal for a new job, three smart contracts are created, tuned and recorded in blockchain, where each of the three smart contracts "knows" "address" (codes) of the other two.

An important point in the future use of blockchain in labor relations is that the blockchain is aimed at the protection of the rights of employees and employers, as well as to ensure control by competent authorities during the verification of the necessary requirements both during the conclusion of the employment contract (the content of the contract) and during the proper fulfillment. Nowadays, competent authorities are not always able to detect in a timely manner, but most importantly prevent illegal actions in terms of employee protection and, as a rule, do not have the opportunity to carry out permanent and complete monitoring of compliance with labor legislation. That is why the use of blockchain and smart contracts based on blockchain technology, which is based on blockchain and smart contracts, enables employee and employers' accurate data, as well as all agreements between them, which are analyzed automatically to facilitate the processing of contracts

and make the processing and perform a complete reference and performance. This will reduce the time of verification by the competent authorities of the legality of the employment contract and the compliance of its contents on labor legislation since the use of blockchain technology will mean that if the platform "missed" such a contract, it automatically means that the contract has been concluded legally and fully meets the requirements of the legislation and does not violate the work. In addition, the competent organ will be able to monitor real-time, simply gaining access to data recorded in blockchains. Employment contracts (in this case, smart contracts) will also be automatically sent to the competent authorities, and due to the unchanging of the data stored in blockchain, payments will always meet the terms of the smart contract, which in turn will meet the fulfillment of payments and based on the hours. Such new digital opportunities will also create the opportunity to eliminate external influence on employers and employees, move away from an outdated approach to supervision and control, and switch to monitoring models that are more algorithmized and independent.

5. Conclusions.

The proposed model utilizing blockchain technology will identify employers and employees, register all employment relationships, control and track the development of labor relations, and ultimately calculate and transfer wages from employers to employees. All these actions will be performed by using decentralized computer programs called "smart contracts". The platform operates through a decentralized system of three typologies of smart contracts: SC-deposit, SC-application, and SC-relationship. All three typologies of smart contracts in the platform system will be recorded to create and automate new labor relations. According to the system of states described above, the platform will customize three smart contracts with the data description data provided by the employer.

In this proposal, I provide the need for a platform (a certain interface), that provides forms and instructions that simplify the creation of a blockchain system and control the course of labor relations. The platform creates smart contracts that simplify the creation of a new job offer provides a friendly interface for applicants, and provides visualization of the state of labor relations.

An important point in the future use of blockchain in labor relations is that the blockchain is aimed at the protection of the rights of employees and employers, as well as to ensure control by competent authorities during the verification of the necessary requirements both during the conclusion of the employment contract (the content of the contract) and during the proper fulfillment. That is why the use of blockchain and smart contracts based on blockchain technology, which is based on blockchain and smart contracts, enables employee and employers' accurate data, as well as all agreements between them, which are analyzed automatically to facilitate the processing of contracts and make the processing and perform a complete reference and performance.

References:

1. Ostapenko L.O., Andrushko S.V., Kuz A.O. (2023). Rol blokcheinu v trudovomu pravi: znachennia dlia osoby pratsivnyka [The Role of Blockchain in Labor Law: Implications for the Personality of the Employee]. *Yurydychnyi naukovyi elektronnyi zhurnal - Legal scientific electronic journal* . № 1. P. 192–195 [in Ukrainian] DOI https://doi.org/10.32782/2524-0374/2023-1/45.

2. Sereda O.H. (2018). Do pytannia vprovadzhennia instytutu blokcheinu v trudovykh vidnosynakh [On the Implementation of the Blockchain Institute in Labor Relations]. *Rozvytok trudovoho prava i prava sotsialnoho zabezpechennia: teoriia i praktyka - Development of labor law and social security law: theory and practice* : tezy dop. ta nauk. povidoml. uchasnykiv VIII Mizhnar. nauk.-prakt. konf. (m. Kharkiv, 05 zhovt. 2018 r.) / za red. O.M. Yaroshenka. Kharkiv: Panov A.M., 2018. P. 189–193. [in Ukrainian].

3. Gabison, G. (2016) "Policy Considerations for the Blockchain Technology Public and Private Applications", 19 *SMU Sci. & Tech. L. Rev*. P. 327.

4. Sangeeta Khorana & Hanna C. Norberg (2022). Can blockchain solve the puzzle of labour standards implementation in international trade? *Chapters, in: Handbook on Globalisation and Labour Standards*. Chapter 24. P. 432–441. Edward Elgar Publishing.

5. Glynou, Maria, Application of Blockchain and Smart Contracts in Employment from the perspective of European Law (September 18, 2021). URL: https://ssrn.com/abstract=3926027 DOI: http://dx.doi.org/10.2139/ssrn.3926027.

6. Schuetz A. (2016). Only written employment contracts inform workers about their rights and duties! Written employment contracts in the European agriculture: practices and abuses, European Federation of Food, Agriculture and Tourism Trade Unions (EFFAT) URL: https://effat.org/wp-content/uploads/2018/11/en-broschure_schriftliche_arbeitsvertrage_in_der_europaischen_landwirtschaft-final.pdf.

7. International Labour Organization (2013). Regulating the employment relationship in Europe: A guide to Recommendation, No. 198, Governance and Tripartism Department International Labour Office, Geneva URL: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40ed_dialogue/%40dialogue/documents/publication/wcms_209280.pdf.

8. Gerstenberger B. (2018). Salary-setting mechanisms across the EU, Publications Office of the European Union, Luxembourg. URL: https://www.eurofound.europa.eu/system/files/2018-03/ef1758en.pdf.

9. Lallai G., Pinna A., Marchesi M., Tonelli R. (2020). Software Engineering for DApp Smart Contracts managing workers Contracts, Conference: DLT 2020 Distributed Ledger Technology At: Ancona. Volume: CEUR Workshop Proceedings Vol-2580. URL: https://www.researchgate.net/publication/340647768_Software_Engineering_for_DApp_Smart_Contracts_managing_workers_Contracts.

10. Unsworth R. (2019). Smart Contract This! An Assessment of the Contractual Landscape and the Herculean Challenges it Currently Presents for "Self -executing" Contracts. In: Corrales M., Fenwick M., Haapio H. (eds) Legal Tech, Smart Contracts and Blockchain. Perspectives in Law, Business and Innovation. Springer, Singapore. https://doi.org/10.1007/978-981-13-6086-2_2.

11. Aumayr-Pintar C., Rasche M. (2020). Minimum wages in 2020: Annual review, Minimum wages in the EU series, Publications Office of the European Union, Luxembourg. URL: https://www.eurofound.europa.eu/system/files/2020-10/ef20005en.pdf.

12. Bercusson B. (ed.) (2002). European Labour Law and EU Charter of Fundamental Rights, summary version, ETUI, Brussels. URL: https://www.etui.org/sites/default/files/EuropeanLabourLawShort%20Web%20version.pdf.

Olena Lutsenko,
PhD, Associate Professor,
Associate Professor of the Department of Labor Law,
Yaroslav Mudryi National Law University
E-mail: o.ye.lutsenko@nlu.edu.ua
ORCID: 0000-0001-9357-8546
Scopus Author ID: 57194875083