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Distributed Ledger Technology (DLT) in Finance: Applications and Regulatory Framework in the European Union

Introduction

The urge for digital transformation has prompted businesses within the European Union to adopt various disruptive technologies to remain competitive in the evolving digital single market. One such technology is Distributed Ledger Technology (*hereinafter referred to as "DLT"*). Although not widely recognized by the majority of consumers, DLT has begun to play a significant role, particularly in the financial transactions sector. This has raised numerous concerns regarding market stability, tax evasion, and the protection of consumers and investors.

This article constitutes an attempt to provide an understanding of DLT and its applications in finance, while also highlighting practical and theoretical concerns as well as the benefits of DLT use in finance. Additionally, it provides an overview of the regulatory framework of the European Union, as part of Europe's Digital Finance Strategy [1], and Greece.

Definition of DLT, Applications in Finance and Concerns for consumers and investors in the European Union

Definition of DLT

DLT is a decentralized software system characterized by interconnected peer-to-peer nodes (*i.e. connected computers*) that operate without a hierarchical structure or centralized control. This technology relies on a shared public ledger to record transactions, with all nodes adhering to the same protocols for transaction registration. In a simple way, *"a distributed ledger is essentially a record of information or database that is shared across the network* [2]*".*

DLT fundamentally transforms the digital transactional model from a centralized to a decentralized and distributed framework. In this model, there is no single central authority responsible for transaction verification. Instead, all nodes within the network share the responsibility of verifying transactions in the common ledger. The system's design requires consensus (*consensus mechanism* [3]) among all network nodes to register a new transaction in the common ledger, coupled with encryption, which eliminates any margin for doubt regarding the authenticity and immutability of transactions. As a result, this decentralized and distributed ledger among the interconnected nodes ensures the validity, transparency and integrity of all transaction records.

Applications, concerns and benefits of DLT in finance

One of the most prominent types of Distributed Ledger Technology (DLT) is blockchain. In a blockchain, transactions are recorded in blocks that are sequentially linked, forming a continuous chain of transactional records in a shared, decentralized ledger. Blockchain technology is most widely recognized for its application **in cryptocurrencies**, such as

Bitcoin and Ethereum, which can be used as payment instruments by entities that accept them. Unlike traditional currencies, these cryptocurrencies are not issued by a central authority. Instead, they are generated through methods such as "mining" and can be purchased via intermediary or exchange platforms. The benefits of cryptocurrencies include lower transaction fees, faster transaction processing, enhanced participant anonymity, and the absence of governmental control.

However, the absence of central authority control over cryptocurrencies poses several risks for consumers and investors. According to European Banking Authority [4], these risks include, among others: a) Consumers may lose their money if an exchange platform fails, goes out of business, or engages in fraudulent activities, b) The value of virtual currencies can fluctuate rapidly and may even drop to zero due to their volatile nature, c) Virtual currency transactions can be exploited for criminal activities, including money laundering.

Except for cryptocurrencies, DLT can be applied in facilitating **trading, banking and investment transactions.** A practical example of DLT application in trading is the collaboration between Germany's central bank and Deutsche Börse, which developed a blockchain system for digital asset trading taking into account the analysis of the project "Blockbaster" [5]. According to the joint report of the Blockbaster Project [6], blockchain technology is a suitable basis for applications in the field of settlement and other financial infrastructures. Additionally, the European Central Bank (ECB) is considering the implementation of a DLT-based recording system for the Digital Euro [7].

Also, DLT can contribute to the automation of contracts (*hereinafter referred to as **"smart contracts**")* with computing algorithms without human intervention*, i.e. if this condition doesn't happen, give automatically the money back to the client*. According to the European Central Bank (*or ECB),* "*Smart contracts, it's like having a paper contract that can read itself and carry out the agreed terms as and when they come into effect* [8]*".* This decentralized (*based on DLT or specifically Blockchain*) software automatically fulfills contract obligations when conditions are verified, executing transaction protocols recorded in the shared ledger. For instance, insurance companies can use smart contracts to automatically verify the occurrence of an insured event *(e.g., a flight delay or cancellation based on airline data or weather conditions)* and process insurance claims accordingly.

DLT in financial sector can provide many benefits to financial transactions. Notably, the fact that transactional information is spread to all computers of the network ledger might make cyber-attacks less likely and less effective, as the attack must target all the computers of the network, because of its distributed and immutable nature [9]. To compromise the system, an attacker would need to target and control the majority of the network, making tampering with information and data exceedingly difficult. This inherent security also helps organizations comply with Article 32 of the GDPR, which mandates the security of personal data [10]. In parallel, DLT solutions can facilitate the accessibility to trusted sharable data, ensuring the right to access to data (*personal or non-personal*) and the transparency of transactions [11].

However, the immutable and distributed nature of Distributed Ledger Technology (DLT) raises significant legal concerns, particularly regarding consumer protection and the enforceability of court decisions. Given that data in a DLT transactions cannot be altered or deleted, consumers may face challenges in repudiating or canceling contracts due to deception, duress, or other valid legal grounds. This immutability could discourage consumers from seeking court protection, as even if a court orders annulment, it may be unenforceable without a mechanism in DLT systems to reverse or modify records. Therefore, it is crucial to consider legal concerns and fundamental principles of Civil Law, especially contract and consumer protection law, when designing and implementing DLT systems, ensuring that mechanisms for legal compliance, such as "contract law compliance by design", are integrated to protect consumer rights and uphold legal enforceability.

European Union's Regulatory Framework on DLT applications

Considering the aforementioned concerns over cryptocurrencies and the importance of consumer and investor protection, as well as the stability and security of the European financial single market, European Union legislator have made efforts to regulate certain aspects of DLT applications, particularly the market of crypto-assets and cryptocurrencies. These efforts are part of the broader EU Blockchain Strategy, which aims to promote legal certainty [12], and the Digital finance package [13]. The following outlines these regulatory measures in chronological order.

Firstly**, Directive (EU) 2018/843 (*5AML)*** introduced the definition of "*Virtual Currencies* [14]", amending Directive 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing. In Greece, this Directive was transposed into national law by Law 4557/2019 as amended by Law 4734/2020. The aim of integrating Virtual Currencies (*such as cryptocurrencies*) into the scope of this Directive is to impose oversight on exchange or wallet providers over suspicious activities that exploit the anonymity of cryptocurrencies, as well as to facilitate competent authorities in monitoring the use of virtual currencies by mandating the registration or licensing of providers dealing with virtual currencies [15].

As FinTech startups rapidly develop DLT infrastructures and applications, the need for uniform and directly applicable regulations across the European Union's DLT market (*including cryptocurrencies*) has become increasingly important. In response, the European Union has adopted two key regulations: a) Regulation (EU) 2022/858 [16] and b) the Regulation (EU) 2023/1114 (*hereinafter referred to as "MiCA Regulation")* [17].

Given that the definition of financial instrument in **Directive 2014/65/EU (*MiFID II*)** does not explicitly cover financial instruments issued via distributed ledger technology, the **Regulation (EU) 2022/858** calls on the member-states to implement measures ensuring that such financial instruments can be traded on the market under the existing legal framework [18]. By the end of the fourth quarter of 2024, the European Securities and Markets

Authority *(ESMA)* will issue guidelines on conditions and criteria for the classification of crypto-assets as financial instruments. It also addresses the operation and supervision of DLT market infrastructure.

To implement these measures, **the Greek** Parliament enacted **Law 5113/2024**. Article 31 of this law expands the definition of financial instruments to include those issued using DLT. Additionally, Articles 32-37 establish the regulations for the permitted registry of DLT-based financial instruments, define the beneficiaries of these instruments, and outline the methods for their transfer. Furthermore, Articles 39-41 define the beneficiaries of DLT-based shares and regulate the procedures for their transfer.

Finally, **the MiCA Regulation** establishes uniform rules for issuers of crypto-assets not covered by other EU financial services legislation, such as those qualifying as financial instruments under Regulation (EU) 2022/858 in conjunction with Directive 2014/65/EU *(MiFID II*). It also sets standards for providers of services related to these crypto-assets, known as crypto-asset service providers. MiCAR aims to ensure transparency and adherence to disclosure requirements for the issuance, public offering, and admission of crypto-assets to trading platforms. Additionally, it seeks to ensure the authorization and supervision of crypto-asset service providers and issuers of asset-referenced tokens and electronic money tokens. The regulation also focuses on protecting holders of crypto-assets and clients of service providers, as well as preventing insider trading, unlawful disclosure of inside information, and market manipulation.

Implementation of Regulation (EU) 2022/858 in Greek Legal Framework

On June 21, 2024, Greece enacted Law No. 5113/2024 (published in Government Gazette No. 96 A'/21.6.2024), which includes provisions for implementing Regulation (EU) 2022/858 concerning the pilot regime for market infrastructures based on distributed ledger technology (DLT). The rapid advancement of technology has significantly impacted the economic activities of Greek businesses. To foster market growth and ensure the smooth operation of transactions, it has become necessary to regulate new technologies and accordingly amend the Law on Sociétés Anonymes (SAs) [19].

In Greece, the Hellenic Capital Market Commission has been designated as the competent authority for implementing this regulation (Article 32 of Law No. 5113/2024). To effectively fulfill its supervisory duties concerning new technologies, the Commission is authorized to enter into memorandums of understanding with public authorities. These agreements will specifically address the supervision and assessment of distributed universal service technology, as well as the information technology and cybersecurity arrangements related to DLT market infrastructures.

Under this legal framework, the concept of "financial instruments of distributed ledger technology" has been introduced, and the definition of "intangible shares and bonds" has been expanded to include intangible securities held or issued through a Central Securities

Depository (CSD) using DLT or a DLT market infrastructure. Consequently, CSDs that utilize DLT are now permitted to issue and hold financial instruments within a DLT trading and settlement system, known as the "DLT market infrastructure." Information on financial instruments registered with a CSD or DLT market infrastructure is maintained in a "central securities depository register" or a "DLT market infrastructure register." The administrator of this register has exclusive control over access to the records, using methods and procedures that ensure the authenticity, validity, uniqueness, and non-repudiation of the information.

This legal development provides Greek companies with an alternative option for issuing intangible securities. In addition to holding them in book-entry form within a CSD, companies can now deposit them in a CSD or market infrastructure operating with DLT. The manner of issuing and holding dematerialized shares is specified in the company's articles of association. Similarly, the possibility of trading bonds on a DLT platform has been established through amendments to Article 59, Paragraph 3 of Law No. 4548/2018.

Moreover, DLT enhances the verification process for shareholders or bondholders of issuing companies. A person is recognized as a shareholder or bondholder with respect to the company if they are registered in the DLT market infrastructure register. The CSD or DLT market infrastructure, through its administrator, may issue a certificate, where required by law, confirming the status of each holder of financial instruments, the number of instruments held, and any charges in rem on these instruments.

References

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12. See Blockchain Strategy | Shaping Europe's digital future (europa.eu).
13. See Digital finance package: Council reaches agreement on MiCA and DORA - Consilium (europa.eu)

14. According to article 1 par. 2(d) of the Directive: "*virtual currencies" means a digital representation of value that is not issued or guaranteed by a central bank or a public authority, is not necessarily attached to a legally established currency and does not possess a legal status of currency or money, but is accepted by natural or legal persons as a means of exchange and which can be transferred, stored and traded electronically;*
15. According to article 47 par. 1 of the Directive.
16. Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology and amending Regulations (EU) No 600/2014 and (EU) No 909/2014 and Directive 2014/65/EU *(MiFID II).*
17. Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937.
18. Recital 59 of Regulation (EU) 2022/858
19. Recital of Law no. 5113/2024, p. 67

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