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THE ROLE OF "MONEY LEGO" IN THE DEVELOPMENT OF DECENTRALIZED FINANCE

РОЛЬ «MONEY LEGO» У РОЗВИТКУ ДЕЦЕНТРАЛІЗОВАНИХ ФІНАНСІВ

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Abstract. *The rapid development of the decentralized finance ecosystem between 2017 and 2020 was technologically driven by smart contracts built on the Ethereum blockchain and compatible networks. A fundamentally new architecture of financial services emerged, in which high modularity and protocol interoperability became the key determinants of success. One of the foundational principles underlying this success is the concept of "Money Lego" – the paradigm of a modular, composable financial construction system. Through the "Money Lego" principle, the philosophy of an open, modular, and programmable financial system is brought to life. Innovation within the crypto-finance ecosystem does not occur incrementally but rather follows an explosive trajectory, whereby increasingly complex and efficient constructs are assembled from simple, standardized building blocks – as the principle unlocks boundless possibilities for the creation of bespoke financial strategies.*

The "Money Lego" architecture has fundamentally transformed the DeFi sector by enabling permissionless innovation, allowing developers to reuse existing financial primitives. However, composability also introduces systemic propagation risks: failures within a single protocol can cascade throughout the entire Lego structure, as has been demonstrated by major exploits and large-scale liquidation events. Accordingly, a thorough understanding of the role of "Money Lego" is essential for forecasting the developmental trajectory of DeFi and for formulating effective regulatory and infrastructural policy in the context of the ongoing transition to Web3-based finance.

Keywords: *DeFi, Money Lego, composability, smart contracts, protocol-controlled liquidity, DeFi 2.0, financial transformation, systemic risk.*

Introduction. The rapid development of the decentralized finance ecosystem between 2017 and 2020 was technologically driven by smart contracts built on the Ethereum blockchain and compatible networks. A fundamentally new architecture of financial services emerged, in which high modularity and protocol interoperability became the key determinants of success. One of the foundational principles underlying this success is the concept of "Money Lego" – the paradigm of a modular, composable financial construction system. Through the "Money Lego" principle, the philosophy of an open, modular, and programmable financial system is brought to life. Innovation within the crypto-finance ecosystem does not occur incrementally but rather follows an explosive trajectory, whereby increasingly complex and efficient constructs are assembled from simple, standardized building blocks – as the principle unlocks boundless possibilities for the creation of bespoke financial strategies. The "Money Lego" architecture has fundamentally transformed the DeFi sector by enabling permissionless innovation, allowing developers to reuse existing financial primitives. However, composability also introduces systemic propagation risks: failures within a single protocol can cascade throughout the entire Lego structure, as has been demonstrated by major exploits and large-scale liquidation events.

Accordingly, a thorough understanding of the role of "Money Lego" is essential for forecasting the developmental trajectory of DeFi and for formulating effective regulatory and infrastructural

policy in the context of the ongoing transition to Web3-based finance.

The purpose of the article is a comprehensive study of the role of the "Money Lego" principle in the development of DeFi, revealing the mechanisms of its impact on innovation, scalability, and resilience of the ecosystem, as well as assessing the associated risks and prospects for further development.

Analysis of Recent Research and Publications. The study by Katona (2021) represents one of the earliest attempts at a systematic academic investigation into the "Money Lego" concept. By examining the capabilities of the blockchain-based "money Lego construction system," the author attempts to demonstrate the profound impact of composability on DeFi. As noted in the work, it is the implementation of the "Money Lego" principle in DeFi that marks a fundamental departure from the isolated architecture of traditional finance. In contrast to bundled services offered by monolithic institutions, decentralized finance unbundles these functions through separate protocols that can interact with one another. Users can combine these protocols with specific functionalities (such as borrowing, exchange, derivatives) depending on their individual needs.

As noted by Luo et al. (2025), the technical side of the "money constructor" capabilities is provided by the characteristics of the Ethereum Virtual Machine (EVM) based on the interaction of smart contracts. In their view, it is Ethereum's flexibility that allows Contract Accounts (CAs) to invoke other Contract Accounts, which ensures the interaction of smart contracts. Consequently, entire DeFi protocols can utilize the financial functions offered by other protocols and combine them like "financial Lego bricks."

The study by Kitzler et al. (2023) proposes a clear methodological framework for identifying and analyzing these so-called building blocks. Their algorithm extracts "building blocks" from Ethereum transaction datasets specific to smart contract protocols. Collectively, these smart contracts contain certain financial functions, such as asset exchange, lending, or liquidity provisioning.

Based on a unique methodology of graph representations to study the similarity of DeFi building blocks, the conclusions of the study by Luo et al. (2025) were formulated. According to the results obtained, the authors insist that the building blocks effectively cluster according to financial functionality (purity reaches a score of 0.888), and this is even more pronounced according to the protocol family (purity reaches a score of 0.864, along with a higher V-Measure score of 0.571). This conclusion is of critical significance for understanding "Money Lego," as protocol-specific implementation patterns often carry more weight than functional similarity. On this basis, it is assumed that code reuse and forking create "dialects" within the space of the broader language of financial primitives.

According to De Carvalho et al. (2022, 2023), flash loans act as paradigmatic examples of the composition of money constructions. Flash loans allow borrowers to access unsecured loans within a single atomic transaction, provided that this loan is repaid before the transaction is completed. Consequently, such a mechanism allows organizations to borrow crypto-assets, trigger various economic events, and repay the loan in a single transaction without the need to provide collateral. This study introduces the concept of the "composability assertion." The main idea of this concept lies in the necessity for auditors to verify the completeness, accuracy, and economic interpretation of the transaction components. It is important to note that this study represents one of the first attempts to address the auditing problem associated with the architecture of money constructions.

Main Results of the Research. The earliest experiments on Ethereum-like blockchains, characterized by the emergence of the first decentralized exchanges (DEXs), represented a phase of "manually assembled" protocols with minimal levels of composability. The Ethereum blockchain accelerated the launch of DeFi innovations, and through the rapid development of token standards (most notably ERC-20) and the growing number of projects, determined the evolution of the industry (Farenyuk, 2026). The growing demand for new tokens and the necessity for instruments to trade and utilize them accelerated the technological formalization of the "Money Lego" principle (Foxley, 2020, July 7).

Within cryptographic protocols, this principle is realized through the property of compatibility or composability of cryptographic protocols. This property of independent protocols and applications manifested in the fact that protocols began to interact freely and combine with one another, creating complex financial schemes. For example, if each protocol performs a single, simple function (such

as exchange, lending, or staking), composability allows a developer to assemble these functions into a new, complex financial instrument without having to build the underlying infrastructure from scratch (Katona, 2021).

The assembly of these elements, resembling a construction set, is only possible under several core principles, namely: open source code and standardization, permissionless integration, and programmability. Because the protocol's code is publicly accessible and the ERC-20 token standard exists on the Ethereum network, this guarantees that one protocol will "understand" the tokens of another (Foxley, 2020, August 13).

The fact that developers do not need to obtain permission from the creators of an existing protocol to integrate its functionality into their own decentralized applications serves as a primary unifying element of this architecture.

The principle of programmability allows the smart contracts of one protocol to call functions embedded in the contracts of another (such as lending, swapping, etc.), creating complex chains of action.

The practical implementation of this principle lies in the fact that individual financial primitives (tokens, liquidity pools, lending protocols, derivatives, oracles, etc.) function as universal building blocks that can be freely combined to create complex financial structures.

Based on this principle, capital efficiency is significantly increased through recursive strategies (for example, utilizing deposited assets across multiple protocols). Furthermore, this principle facilitated the emergence of "protocol-controlled liquidity" models and novel tokenomics (such as vote-escrowed tokens and self-repaying loans), which define the DeFi 2.0 developmental phase. At this stage, the fundamental problem of financial programmability was successfully resolved (Farenyuk, 2026).

The evolutionary trajectory of understanding and utilizing "money legos" has laid the foundation for identifying distinct phases ("waves") in the development of the DeFi sector. Currently, academic literature distinguishes three waves. The first wave is associated with protocol primitives. The second wave manifested through yield optimization. And the third wave, which coincides with the maturation of the "money lego" concept, allows us to speak of abstract finance. This periodization implies that composability itself becomes increasingly complex over time (Mitosis University, 2025).

The first wave of the concept's development, referred to in the literature as protocol primitives, was a time for creating basic "building blocks." Protocols such as Uniswap (November 2018, swapping ETH for tokens), Aave (2017, a decentralized liquidity protocol), and Compound (2017, yield farming), while not complex in themselves, laid the foundation. Their emergence, by breaking down financial functions into discrete, interchangeable modules, clearly demonstrated a departure from traditional banking practices. At this stage, the "maturity" of the concept was measured by the simplicity of integration. Developers learned to invoke one smart contract from another, which was enabled by the Ethereum Virtual Machine (EVM).

The development of the concept corresponding to the second wave was accompanied by the emergence of protocols for yield optimization. A defining characteristic was the scaling up of "money lego" blocks into entire strategies. At this stage, complete DeFi compositions emerged as coordinated combinations of dozens of smart contracts within a single transaction. Using the example of flash loans, where borrowing, a series of economic actions, and loan repayment occur in a single step (that is, within a single transaction), it became evident that this was no longer a simple coupling of two blocks, but a complex engineering construct that had to withstand its own weight within microseconds (De Carvalho et al., 2023). Flash loans, described as an example of "atomic composability", became the perfect illustration of the maturity of this approach. Now, "building blocks" comprised not only basic exchanges or lenders, but entire strategies (Luo et al., 2025).

However, it was precisely at this stage that the first flaws in the "Money Lego" concept became apparent. At its peak, the DeFi 1.0 sector encountered what can be termed the composability paradox (Kitzler et al., 2023). The more protocols were interconnected, the more complex the system became for the end user. Three key challenges emerged: fragmentation of liquidity across networks, complexity of strategy management, and inaccessibility for non-professionals (Mitosis University, 2025).

The subsequent evolution of the concept led to unexpected scenarios. For instance, it turned out

that the codebase of SushiSwap, which is a fork of Uniswap, creates a "Lego" dialect that may not perfectly align with the original. Notably, SushiSwap and Uniswap are decentralized exchanges on the Ethereum blockchain operating under the Automated Market Maker (AMM) model. The original project was Uniswap, and due to a fork of the original codebase, the SushiSwap project emerged as a fork of Uniswap (KuCoin, 2026). The metaphor of a "universal construction set" faced certain criticism and lost its absolute flawlessness. This example made it clear that the "bricks" are not always compatible, even if they appear identical (Luo et al., 2025). The maturity of the concept now demanded not just connection, but a deep audit, defined as a "composability assertion" (De Carvalho et al., 2023).

The reaction to this crisis was the formation of the third wave, marking a period of abstract finance. Infrastructure specifically engineered to facilitate the building of "money legos" began to emerge. The most prominent example of this trend is the Gelato project (July 2020), which positioned itself as a "Money Lego" tool that allows developers to automate transactions based on conditional logic (Foxley, 2020, July 7). This network executes transactions on behalf of users or even decentralized applications themselves based on specific conditions, such as asset price or the collateralization ratio of a debt position. This elevated DeFi to a meta-level of "money Lego parts" featuring automated assembly and interoperability with other Lego parts.

Even more illustrative is the G-UNI (management system) solution developed by Gelato for the updated version of the Uniswap v3 decentralized cryptocurrency exchange. This exchange operates on the principle of an on-chain marketplace, allowing users to buy and sell cryptocurrencies on Ethereum and over ten other blockchains. While the liquidity tokens of the previous Uniswap v2 version were fungible via the ERC-20 standard (the so-called "perfect bricks"), in Uniswap v3 they became non-fungible tokens (NFTs) (i.e., "bad bricks"). The implementation of the G-UNI solution successfully resolved this issue: the management system automatically manages the position and wraps it back into ERC-20, thereby restoring composability. The presence of an ERC-20 wrapper around Uniswap v3 liquidity pool positions is extremely important, as it allows other development teams to offer "Liquidity Mining" incentive schemes on top of G-UNI.

At the end of 2024, Gelato integrated with Factor.Fi to establish an environment characterized by "AI-driven automation" and "omnichain trading". The core idea is that any user can build automated, multi-protocol DeFi strategies directly from the Factor decentralized application without the need to write code (Gelato Network, 2024).

At this stage, combining strategies from different DeFi protocols within a strategy builder, or using ready-made, permissionless DeFi strategy templates that are fully owned and controlled by the user, became highly accessible. The cooperation between Gelato and Factor.Fi abstracts away technical complexities, allowing users to focus entirely on building effective DeFi strategies in record time.

The "Money Lego" principle is no longer limited to a single blockchain; it has evolved into a cross-chain builder. This stage of maturity demonstrates engineering at the level of abstractions, where protocols hide complexity within themselves, presenting a simple, composable interface to the outside world. The high interconnectedness of protocols, which through the implementation of the "Money Lego" principle has become the architectural and economic foundation of DeFi, conceals systemic risks. Research by (Kitzler et al., 2023) has shown that such deep interdependence generates systemic risk, where a vulnerability in a single "brick" can collapse the entire tower.

The 2022 Terra blockchain ecosystem crisis marked the first major cryptocurrency crash and contributed to the collapse of several other key players in the ecosystem. The collapse of Terra provides valuable insights into the dynamics of a sudden run in the absence of oversight, while also highlighting the vulnerabilities of typical decentralized finance architecture (Liu et al., 2023).

The Terra blockchain ecosystem was created by Terraform Labs in 2018 and positioned itself as a DeFi platform with a focus on stablecoins. The primary elements of the ecosystem were two tokens: UST (TerraUSD) and LUNA.

UST was positioned as the first true crypto-stablecoin and was a defining feature of the Terra network. Unlike other prominent stablecoins, such as Tether or Circle, which are backed by off-chain liquid assets like government bonds, UST was not backed by such collateral. Instead, it was supported by a smart contract that allowed one unit of UST to be exchanged for $1 USD worth of Terra's native

currency, LUNA, and vice versa. In economic terms, UST can be compared to perpetual convertible debt with a nominal value of $1 USD, backed by the volatile ecosystem token LUNA. The algorithmic nature of the UST stablecoin was implemented on top of the Anchor lending and borrowing blockchain protocol.

To stimulate the growth of UST, the Anchor protocol offered depositors an extremely high fixed yield of 19.5% APY on UST deposits, which was exceptionally attractive under low-interest-rate conditions. As a result, the volume of deposits surged, and the issuance of UST increased substantially.

Figure 1
Market Capitalization of LUNA and UST

Source: Ehrlich (2022).

To maintain such yields, the ecosystem subsidized payouts using newly issued UST and LUNA. The volume of deposits in Anchor reached nearly $18 billion. This created an unsustainable, pyramidal structure, as new users and token issuance funded these high interest rates.

However, as the volume of deposits grew sharply, the level of required subsidies became increasingly unsustainable. By April 2022, the daily subsidy rate reached $6 million USD, which became the driving factor that forced the Terra community to agree to a proposal to gradually reduce the interest rate to market levels, starting May 1, 2022.

At its peak, LUNA was valued at over $119 (April 2022), and the ecosystem's market capitalization exceeded $40–60 billion. To defend the peg, the Luna Foundation Guard (LFG) accumulated reserves that included approximately 80,000 BTC.

After reaching a peak value of $119.18 on April 5, 2022, the price of LUNA declined amid a general downturn in the cryptocurrency market, which reduced LUNA's relative market capitalization compared to UST. By the end of April 2022, a significant decrease in inflows and an increase in withdrawal requests from the Anchor protocol were observed.

The first signs of a mass capital flight appeared on May 7, 2022, when two large addresses belonging to banks withdrew 375 million UST through the Anchor platform. Blockchain technology allowed investors to closely track each other's actions, significantly accelerating this process. The UST stablecoin began to lose its peg and fell below the $0.99 threshold.

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LFG began selling BTC and other assets to buy back UST and support the peg. Initially, they managed to stabilize it at around $0.995, but selling pressure continued. Large and sophisticated investors exited first. UST plummeted to $0.75.

Figure 2

Price dynamics of LUNA and UST over a week

Source: (Malwa, 2022).

The UST peg design also allowed users to exit UST either through direct sale of UST or through an initial swap of UST for LUNA followed by selling LUNA at the market price. Users mass-swapped UST for LUNA through the protocol's native mechanism. As UST was swapped for LUNA, the price of LUNA plummeted, leading to further capital dilution and driving LUNA's price even lower. This created a scenario known as the "Death spiral", where in just three days, LUNA's supply surged from 1 billion to 6 trillion, and the price of LUNA collapsed from $80 USD to virtually zero.

The Terra blockchain was halted several times in attempts to stabilize. By May 13, Anchor was nearly depleted, with less than $2 billion UST remaining.

Total losses amounted to around $40–60 billion in market capitalization within a few days. This triggered a chain reaction in the cryptocurrency market (causing issues for Three Arrows Capital, Celsius, and Voyager) and set the stage for the subsequent collapse of the FTX exchange later that year.

Conclusions. The "Money Lego" principle reflects the high composability of smart contracts within an open blockchain environment. Unlike traditional finance, where products are developed in isolation within banking or financial institutions, in DeFi, any developer can utilize public smart contracts as ready-made modules. This enables the creation of new financial instruments—ranging from automated market makers (AMMs) and yield farming to complex structured products, synthetic assets, and algorithmic stablecoins—in a matter of days or even hours.

Thanks to composability, the DeFi sector demonstrated exponential growth in 2019. The "Money Lego" principle became a catalyst for innovation, significantly lowering entry barriers for new market participants and accelerating the evolution of financial services.

However, composability carries not only opportunities but also systemic risks. The Terra/Luna case became a classic example of "Money Lego" systemic risks in DeFi, where a single protocol (Anchor) could drag down the entire ecosystem. It demonstrated the limits of algorithmic stablecoins, the vital importance of real collateral, the risks of "bank runs" in a transparent blockchain environment, and the danger of overpromising high yields.

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