Ownwerx: A Cryptocurrency Backed by Science

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01.03.2025

Abstract

The scientific funding system is centralized, bureaucratic, and prone to ideological bias. Researchers seeking financial support must pass institutional gatekeepers who reward conformity and compliance over innovation. Ownwerx (OWNX) is a cryptocurrency that enables researchers to tokenize their contributions and trade them freely. Built on a Proof-of-Contribution (PoC) mechanism, OWNX ensures that funding flows directly to those who advance knowledge, rather than those who adhere to ideological mandates. By eliminating intermediaries and replacing subjective approval processes with transparent, cryptographic validation, Ownwerx restores autonomy to the scientific community. A trustless network of validators ensures that scholarly contributions are immutably recorded, fairly rewarded, and resistant to manipulation. In addition to being the Bitcoin for science, OWNX is the future of immutable science designed to preserve the integrity of scientific inquiry and realign research funding with merit rather than ideology.

Nomenclature

Symbol	Definition	Units/Dimensions
N	Total supply of OWNX tokens	OWNX (dimensionless)
M_t	Block reward at time t	OWNX
M_0	Initial mining reward	OWNX
T_h	Halving period	years
S_t	Cumulative supply at time t	OWNX
C_t	Cumulative validated scientific contributions	Dimensionless
$f(C_t)$	Contribution-weighting function	Dimensionless
R_t	Reserved token supply at time t	OWNX
λ	Fraction of mined tokens allocated to reserve	Dimensionless
D_t	Mining difficulty at time t	Dimensionless
H_t	Validated computational effort in the network	Dimensionless
$E[T]$	Expected block mining duration	Time (s)
F	Difficulty adjustment factor	Dimensionless
E_t	Exchange rate between ERC-1155 assets and OWNX	OWNX per ERC-1155 fraction
E_{min}	Minimum exchange rate requested by researcher	OWNX per ERC-1155 fraction
B_t	Weighted bid value at time t	OWNX
B_i	Individual bid from staking participant i	OWNX
w_i	Staked OWNX holdings of participant i	OWNX
T_b	Time limit for bidding round	Time (s)

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F_t	Total ERC-1155 fractional units generated	ERC-1155 fractions
α	Proportionality factor for ERC-1155 conversion	Dimensionless
β	Scaling coefficient for difficulty-based exchange rate limit	Dimensionless
P_t	Net profit available for reinvestment	OWNX
NFT_t	Non-fungible token representation of donation	NFTs
D_t	Total donations received at time t	OWNX
$g(D_t)$	Function mapping donation amounts to NFT records	Dimensionless
U_i	Utility function for researcher i	Dimensionless
F_i	Funding received by researcher i	OWNX
C_i	Cost incurred by researcher i	OWNX
U_j	Utility function for staking participant j	Dimensionless
v_j	Perceived value of supporting a research project	Dimensionless
B_j	Bid amount placed by staking participant j	OWNX
w_j	Staked amount by participant j	OWNX

Introduction

The integrity of scientific inquiry is increasingly jeopardized by the politicization of research funding. Traditional grant systems, controlled by centralized institutions, frequently prioritize projects that align with prevailing ideological and corporate agendas, while marginalizing those that challenge dominant narratives (Le, 2018). This selective allocation of resources has led to an erosion of academic freedom, discouraging risk-taking and limiting the scope of independent research (Greaves and MacAskill, 2021).

The monopolization of scientific funding has profound consequences. Research priorities are increasingly shaped by bureaucratic institutions that favor risk-averse projects and incremental advancements over revolutionary discoveries (Pisarski, 2021). Government-backed grants and corporate sponsorships often serve political and commercial interests rather than scientific merit, resulting in an academic environment that discourages intellectual diversity and bold innovation (O'Donnell, 2016).

Ideological movements such as longtermism and accelerationism further compound these issues. Longtermism advocates prioritizing research based on speculative existential threats, diverting funding away from immediate global challenges (Torres, 2017). While its proponents argue for strategic foresight, critics highlight that its assumptions disproportionately empower elite decision-makers at the expense of urgent scientific needs (Greaves and MacAskill, 2021). Accelerationism, on the other hand, promotes rapid technological advancements with little ethical oversight, leading to increased economic instability and societal disruption (Andrey Shilovtsev, 2020).

Additionally, transhumanism presents an increasingly influential perspective that seeks to enhance human cognition and physiology through bioengineering and artificial intelligence (Catellin, 2009). However, concerns persist that these advancements may commodify human identity and widen societal inequalities, benefiting a select few while exacerbating ethical dilemmas (Andrey Shilovtsev, 2020). Critics argue that transhumanism prioritizes corporate and technological interests over collective well-being (Evans, 2020).

Ownwerx (OWNX) is a new cryptocurrency designed to counteract these structural constraints. By leveraging blockchain technology, Ownwerx allows researchers to tokenize their contributions, creating an immutable, transparent, and equitable funding ecosystem. OWNX provides critical infrastructure to serve the DeSci movement and beyond (Ethereum, 2023). Unlike traditional proof-of-work models reliant on computational power (Andrey Shilovtsev, 2020), the proof-of-contribution (PoC) mechanism relies on human and human-machine collaboration. It sets a new paradigm for cryptocurrency mining,

one that is useful to science and society.

OWNX cryptocurrency functions as both an incentive and a store of value, similar to Bitcoin, but tailored for scientific research. By decentralizing financial support, Ownwerx eliminates bureaucratic gatekeeping, allowing scholars to pursue knowledge freely without institutional interference. This new cryptocurrency redefines research funding, aligning it with the principles of open inquiry, meritocracy, and academic freedom.

The following sections outline the formal economic model of Ownwerx, its tokenization framework, and the mechanisms that ensure the sustainability and integrity of decentralized scientific funding.

Transactions in Scholarly Research

Scientific research is built upon a series of transactions. These transactions occur whenever two or more researchers interact to contribute, evaluate, or refine scholarly work. Every collaborative effort, review process, or editorial decision represents an exchange of intellectual value.

One of the most fundamental transactions in research is collaborative authorship. Scientists work together to design studies, conduct experiments, and write papers. Each researcher contributes knowledge, labor, or resources, and in return, they share authorship and recognition. Similarly, peer review functions as a validation process where scholars examine each other's work. A journal submits a manuscript to reviewers, who analyze its quality and provide feedback. The authors benefit by improving their work, while reviewers contribute to maintaining academic standards.

Editorial work is another transactional process. Editors oversee submissions, assign reviewers, and make final publication decisions. Their work ensures that only high-quality research is published. Thesis examinations follow a similar structure. A candidate submits their work to a panel of experts, who assess its validity and significance. In both cases, multiple parties engage in an intellectual exchange that determines the fate of a scholarly document.

All these transactions share a common feature: they involve scholarly decision-making over a tangible research output, be it a paper, dataset, or experiment. This intrinsic transactional nature of research makes it highly suitable for blockchain-based verification. Ownwerx capitalizes on this by implementing a Proof-of-Contribution (PoC) system. Every time researchers engage in a transaction—such as publishing a paper, reviewing an article, or contributing data—they effectively mine OWNX cryptocurrency. These tokens serve as a store of value, much like Bitcoin, but tailored for academic contributions.

By recording contributions immutably on the blockchain, Ownwerx ensures transparency, trust, and fairness in research transactions. Scholars are directly rewarded for their work, bypassing bureaucratic funding structures and enabling a more autonomous scientific economy. In the next section, we will explore the technical framework behind the Proof-of-Contribution mechanism and how it enhances research funding and attribution.

Ownwerx in Action

Scientific research requires trust. Researchers rely on peer validation, collaboration, and funding to bring discoveries to life. Ownwerx ensures these transactions are fair, transparent, and rewarding.

When two or more researchers document their work using Ownwerx, they create new OWNX tokens. This process is called mining through Proof-of-Contribution. Each time a research transaction is recorded, the system generates OWNX (ERC-20)[1] tokens on the blockchain.

[1]ERC-20 is a standard for fungible tokens on the Ethereum blockchain. These tokens can be freely exchanged and transferred between users.

These tokens are divided among three groups. First, the researchers involved receive a share. They are rewarded for their contributions. Second, verifiers get a portion. They ensure that the recorded research is legitimate. Third, a portion goes to the Ownwerx Treasury. The Treasury funds system maintenance, development, and the engineers and scientists behind Ownwerx.

All OWNX tokens are backed by real financial support. Donations to the Ownwerx non-profit fund give them value. This ensures the currency remains stable and serves its purpose.

Researchers can use their OWNX tokens in two key ways. First, they can create ERC-1155 assets[2]. These assets act as digital proof of ownership over their scientific work. Second, they can establish tokenized fundraising contracts. This allows them to raise funds by setting an exchange rate between their ERC-1155 asset and OWNX tokens.

Funders (donors OR investors) bid to set a value of these assets. This bidding process ensures a fair exchange, allowing researchers to secure funding without relying on traditional grant systems. Everything happens transparently on the blockchain, free from bureaucratic influence. Ownwerx transforms how research is funded, recorded, and validated. It rewards knowledge, decentralizes funding, and secures ownership for those who drive scientific progress.

Token Emission Model

The emission of OWNX tokens follows a controlled supply model designed to ensure long-term scarcity and value retention. The total supply of OWNX is capped at:

$$N = 10^8 \text{ OWNX}. \tag{1}$$

To regulate supply and maintain economic sustainability, the emission schedule follows an asymptotic decay function governed by periodic halvings. The block reward at time t is given by:

$$M_t = M_0 \cdot \left(\frac{1}{2}\right)^{\frac{t}{T_h + \kappa_t}} \tag{2}$$

where:

$$\kappa_t = \gamma \cdot \frac{H_t - H_{t-1}}{H_{t-1}} \tag{3}$$

Here, γ is a smoothing parameter, and H_t represents the validated computational effort, where M_0 is the initial mining reward, T_h represents the halving period, and $\lfloor \cdot \rfloor$ is the floor function ensuring discrete halvings.

The cumulative supply equation is adjusted to incorporate dynamic mining participation:

$$S_t = N \left(1 - \frac{1}{2^{\frac{t}{T_h + \kappa_t}}}\right) \tag{4}$$

This ensures supply remains predictable yet responsive to network fluctuations. This equation ensures that the cumulative supply asymptotically approaches N, preventing an oversupply scenario while maintaining a predictable deflationary trajectory.

Mining rewards are further adjusted by a contribution-weighting function. Let C_t denote the cumulative validated scientific contributions at time t. The weighted emission model follows:

$$M_t(C_t) = M_t \cdot f(C_t), \tag{5}$$

[2]ERC-1155 is a standard for semi-fungible tokens that represent ownership of unique digital or physical assets. It allows for both single and multiple copies of assets to be traded and verified.

where $f(C_t)$ is a scaling function that accounts for the quality, significance, and verification of the contribution. This ensures that researchers producing human-first, reproducible, and ethical scientific work receive proportionally higher mining rewards.

Contribution-Weighting Function

The emission of OWNX tokens is regulated by a proof-of-contribution (PoC) mechanism that ensures funding allocation is based on verifiable scientific contributions. Let C_t denote the cumulative validated scientific contributions at time t. To prevent arbitrary reward assignment and ensure fair distribution, we introduce a logarithmic contribution-weighting function:

$$f(C_t) = \frac{\log(1 + C_t)}{\log(1 + C_{\max})} \tag{6}$$

where $C_{\max}$ represents the maximum recorded cumulative contributions within a predefined observation window. The function $f(C_t)$ normalizes the contribution scale, ensuring that higher contributions yield greater mining rewards while maintaining diminishing returns to prevent centralization. This formulation guarantees that researchers producing high-quality, reproducible, and ethical contributions receive proportionally higher mining rewards. Furthermore, the function mitigates the risk of reward monopolization by preventing large contributors from receiving disproportionately high emissions. The weighting function is updated dynamically based on periodic evaluation of $C_{\max}$, ensuring that mining rewards remain responsive to evolving research contributions.

Mining Difficulty

The mining difficulty adjustment mechanism ensures that the mining process remains stable and secure while maintaining a predictable rate of token issuance. The difficulty parameter, denoted as D_t, dynamically adjusts based on the computational effort expended by miners. Unlike traditional proof-of-work blockchains, where difficulty is solely dependent on hash power, Ownwerx incorporates a contribution-based difficulty mechanism that aligns with its proof-of-contribution model. To prevent excessive volatility, we may introduce a logarithmic smoothing function for difficulty adjustment:

$$D_t = D_{t-1} \cdot \left(1 + \frac{1}{\rho} \ln\left(1 + \frac{H_t}{H_{t-1}}\right)\right) \tag{7}$$

where ρ is a latency parameter.

The mining difficulty parameter, D_t, is a critical component of the Ownwerx ecosystem, ensuring stability in the issuance of OWNX tokens and preventing inflationary shocks. In traditional Proof-of-Work (PoW) systems, difficulty is adjusted purely based on computational effort. However, the Ownwerx framework incorporates a contribution-based validation mechanism to align difficulty with scientific proof-of-contribution.

To prevent manipulation and ensure network integrity, we redefine the difficulty adjustment function to include a minimum difficulty threshold:

$$D_t = \max\left(D_{\min}, D_{t-1} \cdot \frac{H_t}{H_{t-1}}\right) \tag{8}$$

where $D_{\min}$ is the lower-bound difficulty threshold preventing artificially reduced mining effort, and H_t represents the validated computational effort at time t. This constraint ensures that difficulty cannot fall below a minimum level, preventing adversarial attacks that attempt to exploit low-difficulty periods.

To further smooth difficulty transitions and mitigate excessive volatility, we introduce an exponential damping function:

$$D_t = \max\left(\frac{D_{t-1}}{F}, \min(D_{t-1} \cdot F, D_t)\right) \cdot e^{-\gamma|H_t - H_{t-1}|} \tag{9}$$

where F is a scaling factor that limits abrupt changes in mining difficulty, and γ is a sensitivity parameter that controls the impact of sudden computational effort fluctuations. The exponential term $e^{-\gamma|H_t - H_{t-1}|}$ ensures that if the change in H_t between consecutive mining periods is large, the adjustment process is progressively dampened. Furthermore, the expected block mining duration is modified to:

$$E[T] = \frac{D_t}{H_t + \alpha C_t} \tag{10}$$

where C_t represents cumulative validated scientific contributions, and where H_t represents the validated computational effort in the network at time t, and D_{t-1} is the previous difficulty level. This ensures that as participation in the network grows, the difficulty scales accordingly, maintaining a consistent issuance rate and preventing excessive inflation.

To maintain the expected time between mined blocks, the expected mining duration $E[T]$ is governed by the relation:

$$E[T] = \frac{D_t}{H_t}. \tag{11}$$

This equation ensures that the average time between new blocks remains stable, even as computational participation fluctuates. The difficulty adjustment process ensures that block issuance remains steady over time, preventing rapid fluctuations that could undermine network security and stability. Furthermore, to prevent manipulation of the difficulty adjustment algorithm, the system incorporates a difficulty smoothing function, which limits abrupt changes in difficulty:

$$D_t = \max\left(\frac{D_{t-1}}{F}, \min(D_{t-1} \cdot F, D_t)\right), \tag{12}$$

where F is an adjustment factor that restricts difficulty increases or decreases beyond a certain threshold. This mechanism ensures that large-scale fluctuations in mining participation do not lead to instability in the network.

The Utility of Ownwerx

The integration of ERC-1155 assets with OWNX tokens provides a dynamic mechanism for decentralized research funding. Unlike static exchange rate models, where the valuation of fractionalized assets is predetermined, Ownwerx employs a bidding-based dynamic exchange rate system that ensures accessibility, fairness, and decentralization in the funding process. This mechanism creates a transparent and market-driven valuation framework where research projects compete for financial support based on community participation and staking incentives.

The ERC-1155 standard introduces a two-tiered asset structure: a non-fungible component, which encodes legally binding contracts, and a fungible fractional component, which facilitates economic transactions and liquidity. The fractional component of ERC-1155 assets correlates with OWNX through an algorithmically managed exchange rate, denoted as E_t. This rate is not predetermined but established through an open bidding process, where the community dynamically adjusts funding allocations based on demand and staking power.

Let E_{min} represent the minimum exchange rate requested by a researcher for funding. To prevent

price manipulation and introduce scarcity-based corrections, the exchange rate follows:

$$E_t = \max\left(E_{\min}, \frac{\sum_{i=1}^{N} w_i B_i}{\sum_{i=1}^{N} w_i + \delta_t}\right) \tag{13}$$

where:

$$\delta_t = \xi \cdot \frac{S_t - R_t}{N} \tag{14}$$

where ξ acts as a scarcity sensitivity coefficient to regulate market fluctuations, and where B_i represents an individual bid from a staking participant i, weighted by their staked OWNX holdings w_i. This formula ensures that while researchers can propose a minimum viable exchange rate, the community can actively influence pricing by increasing or decreasing it through transparent bidding rounds.

The bidding process follows a time-limited auction mechanism, where staked OWNX holders can submit bids to either increase or stabilize the exchange rate. Let T_b define the fixed bidding duration per funding round. The process can be mathematically formulated as follows:

$$E_t(T_b) = \begin{cases} E_{min}, & \text{if no valid bids are placed within } T_b, \\ \max(E_{min}, B_{avg}), & \text{otherwise,} \end{cases} \tag{15}$$

where B_{avg} represents the weighted mean bid value from staking participants. This ensures that even in the absence of active bidding, the researcher is guaranteed their requested exchange rate. However, in a competitive environment, the community determines the final valuation dynamically.

The valuation of ERC-1155 assets in the Ownwerx ecosystem is governed by a staking-based bidding system, where staking participants influence the exchange rate E_t through their weighted bids. However, excessive centralization of staking power can lead to disproportionate control over research funding, potentially limiting fair access to resources. To prevent this, we could introduce a stake-weight normalization function that mitigates the dominance of large staking participants. Accordingly, we can redefine the staking-weighted valuation mechanism as:

$$E_t = \max\left(E_{\min}, \frac{\sum_{i=1}^{N} w_i^{\alpha} B_i}{\sum_{i=1}^{N} w_i^{\alpha}}\right) \tag{16}$$

where w_i represents the OWNX holdings of staking participant i, and $\alpha \in (0, 1]$ is an exponent that reduces the influence of high-staked participants. When $\alpha < 1$, the effective weight of larger stakes is sub-linearly scaled, preventing a single entity from excessively dominating the bidding process.

To further enforce decentralization, we introduce a stake distribution cap that limits the percentage of total staked tokens any single participant can hold:

$$w_i \leq \delta \sum_{j=1}^{N} w_j, \quad \forall i \tag{17}$$

where $\delta \in (0, 1]$ defines the maximum allowable fraction of the total stake any individual participant can control. This ensures that a single entity cannot exceed a predetermined percentage of the total staking pool, preserving fairness in the bidding-driven funding mechanism.

These constraints create a more equitable research funding environment by preventing wealth concentration from disproportionately influencing scientific resource allocation while maintaining a competitive and decentralized marketplace.

The total number of ERC-1155 fractional units generated at time t, denoted as F_t, is governed by:

$$F_t = \alpha M_t \cdot E_t, \tag{18}$$

where α is a proportionality factor that ensures correct valuation between OWNX and ERC-1155 fractions. This creates a self-regulating funding system, where fractional assets increase in value as the network matures and competition rises.

To ensure economic stability and prevent price manipulation, additional constraints are introduced:

$$E_t \leq \beta D_t, \tag{19}$$

where D_t is the current mining difficulty, and β is a scaling coefficient that limits excessive inflationary fluctuations. This condition aligns funding dynamics with the overall network difficulty, ensuring that as mining becomes more competitive, funding valuations remain reflective of network growth and security.

Ownwerx Economic Model

The economic model of Ownwerx is structured to maintain a stable and self-sustaining ecosystem, ensuring that research funding remains decentralized, transparent, and equitable. The funding mechanism follows a circular Evergreen model, where net profits are continuously reinvested in scientific initiatives, eliminating financial speculation while preserving long-term sustainability.

The primary source of funding is the staking reserve wallet, which accumulates contributions from mined tokens and donations. The staking reserve at any time t is governed by the recursive relation:

$$S_t = S_{t-1} + \lambda P_t, \tag{20}$$

where S_t represents the staking reserve at time t, P_t is the net profit available for reinvestment, and λ is the reinvestment rate. This mechanism ensures that available funds for scientific projects grow over time while maintaining a deflationary issuance model.

A critical feature of Ownwerx's economic model is that donors receive no financial or speculative returns. Instead, contributions are rewarded through two primary incentives: tax credits and symbolic recognition via ERC-1155 assets. Let D_t represent the total donations at time t. The corresponding non-fungible token (NFT) representation of the donation is formalized as:

$$NFT_t = g(D_t), \tag{21}$$

where $g(D_t)$ is a function mapping donation amounts to on-chain immutable records, immortalizing donor contributions in the blockchain.

Market Stability and Equilibrium

The Ownwerx ecosystem operates under an equilibrium-seeking mechanism, ensuring that the flow of funds between mining, staking, and research funding remains balanced. To stabilize funding, we introduce a dynamic liquidity buffer:

$$M_t + D_t = R_t + F_t + L_t \tag{22}$$

where:

$$L_t = \omega \cdot |R_{t-1} - R_t| \tag{23}$$

where M_t represents newly mined tokens, D_t denotes donations, R_t is the staking reserve contribution, and F_t is the total amount allocated to researchers via ERC-1155 assets. This equation ensures that the inflow of tokens remains proportional to the system's demand for funding, preventing imbalances that

could lead to liquidity shortages.

Applicability of Dynamic Liquidity Management

Since the Ownwerx ecosystem must rely on a balanced allocation of mined tokens, staking reserves, and donations to sustain research funding. However, sudden spikes in funding demand or fluctuations in staking participation can create liquidity imbalances, leading to funding shortages for researchers. To mitigate these risks, we introduce a dynamic liquidity buffer mechanism that adjusts reserve allocations in response to demand fluctuations.

To maintain equilibrium between token inflows and research funding, we modify the original market balance equation:

$$M_t + D_t + L_t = R_t + F_t \tag{24}$$

where L_t represents an emergency liquidity buffer dynamically released when funding demand exceeds expectations. The liquidity buffer is computed as:

$$L_t = \eta \left(F_t - F_{t-1} \right) \tag{25}$$

where η is a liquidity response coefficient regulating the fraction of funding surges that should be counterbalanced. The buffer ensures that **temporary surges in research funding demand** do not disrupt ecosystem stability by injecting additional liquidity from staking reserves.

To prevent excessive reliance on liquidity injections, we impose an upper bound on reserve drawdowns:

$$L_t \leq \lambda R_t \tag{26}$$

where λ defines the **maximum allowable fraction** of the staking reserve that can be allocated for liquidity adjustments within a single funding cycle. This condition ensures that the staking pool remains sufficiently capitalized while providing flexibility in response to research demand volatility.

By integrating this liquidity risk management framework, the Ownwerx ecosystem remains resilient against unpredictable fluctuations in funding requirements, ensuring a stable and sustainable allocation of resources for decentralized scientific research.

The exchange rate E_t between ERC-1155 assets and OWNX follows a bidding-driven model, ensuring that funding remains fair and accessible. Researchers set a minimum requested exchange rate, E_{min}, while the final rate is determined through a competitive staking-driven auction:

$$E_t = \max \left(E_{min}, \frac{\sum_{i=1}^{N} w_i B_i}{\sum_{i=1}^{N} w_i} \right), \tag{27}$$

where B_i is the bid from staking participant i, weighted by their staked holdings w_i. This ensures that funding remains community-driven, reflecting real-time market sentiment and researcher demand.

Game-Theoretic Analysis of Incentives

The interactions among miners, researchers, and staking participants in the Ownwerx ecosystem form a non-cooperative game, where each agent strategically seeks to optimize their respective outcomes while adhering to the decentralized funding principles of the network. The underlying economic mechanisms governing these interactions must ensure stability in research funding, fair distribution of token incentives, and equilibrium between resource allocation and scientific contributions.

Researchers within the ecosystem compete for funding through the ERC-1155 fractionalization mechanism, requiring them to determine an optimal funding request strategy. The utility function of a researcher i is expressed as

$$U_i = F_i - C_i, \tag{28}$$

where F_i denotes the funding received through ERC-1155 fractionalization, and C_i represents the cost incurred in producing and validating scientific contributions. Since the funding received is influenced by the exchange rate E_t, researchers must strategically select a requested exchange rate E_{req} that balances competitive pricing with sufficient financial support. The optimal funding request satisfies the equilibrium condition

$$\frac{\partial U_i}{\partial E_{\text{req}}} = 0, \tag{29}$$

ensuring that the chosen exchange rate maximizes expected funding while maintaining alignment with market conditions.

Staking participants, responsible for financing research through a competitive bidding process, allocate OWNX tokens in exchange for ERC-1155 fractional ownership. Their decision-making is governed by a utility function that incorporates both financial and social incentives, formulated as

$$U_j = v_j B_j - w_j + \rho S_j. \tag{30}$$

In this equation, v_j represents the perceived value of supporting a particular research project, while B_j corresponds to the bid amount placed by the participant. The staked amount, denoted as w_j, imposes a liquidity constraint, limiting the ability to engage in additional staking rounds. Furthermore, staking participants gain reputational benefits over time, quantified by the social prestige score S_j, which reflects their historical contributions to the ecosystem. The parameter ρ serves as a weight factor that translates social prestige into tangible incentives.

The optimal bidding strategy for staking participants is derived from the equilibrium condition

$$\frac{\partial U_j}{\partial B_j} = 0, \tag{31}$$

which ensures that participants maximize utility by carefully balancing financial returns with the long-term benefits of community engagement.

The valuation of ERC-1155 assets is determined through a dynamic exchange rate E_t, influenced by the weighted bidding process of staking participants. The exchange rate follows the relation

$$E_t = \max\left(E_{\min}, \frac{\sum_{i=1}^{N} w_i^{\alpha} B_i}{\sum_{i=1}^{N} w_i^{\alpha}}\right). \tag{32}$$

Here, the parameter $\alpha \in (0, 1]$ reduces the influence of participants with disproportionately high stakes, ensuring that the exchange rate reflects decentralized participation rather than being dominated by large stakeholders. To maintain equilibrium in research funding, the total funds allocated to researchers must balance the staking bids placed by participants, requiring that

$$\sum_{i=1}^{N} F_i = \sum_{j=1}^{M} B_j. \tag{33}$$

This equation enforces a fair distribution mechanism, ensuring that researcher funding demand remains met through available staking resources.

Miners in the Ownwerx ecosystem earn rewards based on validated scientific contributions, following the weighted emission model

$$M_t(C_t) = M_t \cdot f(C_t). \tag{34}$$

The function $f(C_t)$ introduces a contribution-weighting mechanism, ensuring that mining rewards correspond to the quality and quantity of scientific contributions rather than arbitrary computational expenditure. Miners seek to maximize expected rewards by optimally allocating their computational resources, subject to the equilibrium condition

$$\frac{\partial M_t}{\partial H_t} = 0. \tag{35}$$

This optimization guarantees that mining effort is directed toward knowledge production rather than raw computational power, reinforcing the network's commitment to scientific progress.

The Ownwerx ecosystem reaches a Nash equilibrium when no participant—whether a researcher, staking participant, or miner—has an incentive to unilaterally alter their strategy. The necessary conditions for achieving this equilibrium are given by the set of equations

$$\frac{\partial U_i}{\partial E_t} = 0, \quad \frac{\partial U_j}{\partial B_j} = 0, \quad \frac{\partial M_t}{\partial H_t} = 0. \tag{36}$$

Under these conditions, researchers determine exchange rate requests that optimize their funding potential, staking participants bid in a manner that maximizes both financial and reputational returns, and miners allocate computational resources efficiently to derive the highest possible contribution-based rewards. The interplay of these strategic behaviors ensures that research funding remains decentralized, transparent, and driven by scientific merit, free from speculative financial manipulation or excessive centralization.

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