Quædrant: Real-World Asset Management on Blockchain

Abstract. Decoupling ownership from utility in real-world assets, like real estate, lays the groundwork for traditional businesses to leverage technological advancements for scalable growth. We introduce a tokenization framework designed to digitize the ownership of real-world assets, harnessing the vast advantages of blockchain technology. This approach transforms real assets into readily accessible, on-demand resources, effectively forging a seamless connection between the tangible and digital domains. By integrating the conventional realm of property ownership with blockchain's revolutionary capabilities in accounting and transparency, we pave the way for a synergistic enhancement of traditional business models, elevating them with unprecedented efficiency and scalability.

1. Introduction

Real estate investment has traditionally been a complex and often high-risk endeavor, with numerous challenges that can lead to financial loss or missed opportunities. From natural disasters to project failures, managing a property portfolio can be a complex task, especially for those with limited resources or experience. However, the advent of blockchain technology and tokenization has the potential to revolutionize the real estate industry, providing a more accessible, efficient, and secure way to invest in and manage properties.

The concept of transforming complex data into a more manageable and interpretable form, a practice often seen in the mathematical manipulation of spaces and dimensions [1], underpins our strategy for the real estate market. By tokenizing real estate assets, we essentially compress the vast complexities of property investment into a streamlined and efficient digital marketplace. This strategy ensures that real estate is not underutilized or locked away beyond the reach of potential investors. Instead, it becomes a vibrant, actively engaged segment of the broader economic landscape. This approach, inspired by mathematical efficiency and precision, promises to usher in a new era of real estate utilization, where every asset can achieve its full potential in a densely interconnected market environment.

2. Problems and solutions

Tokenization offers a solution to various challenges faced in the traditional real estate market, such as high barriers to entry, limited liquidity, lack of transparency, and difficulties in managing and maintaining properties. By enabling fractional ownership of properties through tokenization, the cost of entry is reduced, and investors can benefit from greater diversification opportunities. Liquidity is also improved, as tokens can be easily traded on digital exchanges, providing investors with greater flexibility and control over their investments.

Additionally, tokenization on blockchain creates a more transparent and efficient property management system. Intermediaries are minimized, and automation is introduced, improving overall efficiency. Transparent property management and real estate transactions reduce the risk of fraud and increase market efficiency [2]. Foreign investors can also benefit from tokenization, as they gain easier access to global real estate markets. Tokens allow investors to buy and sell property shares in any market, regardless of their location, while providing greater transparency and efficiency in cross-border transactions.

3. Tokenization framework

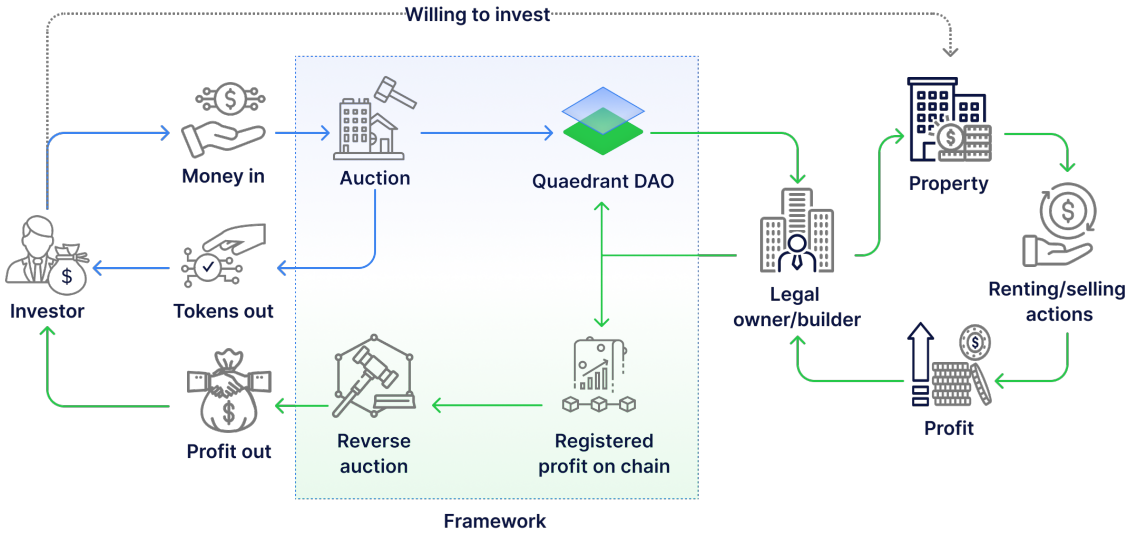
We propose a token initially binded to the ownership of one square meter. This square meter will represent a global share of all real estate assets in the portfolio, also known as Tokenized Real Estate Baskets, divided by their total square footage.

The process of creating new tokens, also known as minting, will be conducted exclusively through auctions, without any pre-minting or other questionable mechanisms.

Reward distribution will occur in a similar fashion, in the form of reverse auctions. However, rewards should be settled in any form except the tokens themselves. By simplifying, tidening and securing mechanisms for token creation and distribution, investors are guaranteed by smart contracts not to be diluted, ensuring the tokens are always backed by real-world assets.

Core principles:

- Each digital token aims to represent ownership of one physical square meter.
- A single square meter represents a global portfolio of shared assets.
- Token minting mechanisms and rewards for token holders must always remain simple, strict and transparent.
- Generated profits (rewards) should not be distributed in the form of tokens.
- The framework is the foundation for completing the economic cycle of investing and profiting, allowing more complex tools to be built on top of this foundation.



Consider an example of a minting auction. Assume we have a perfect balance of token to backing square meter at a 1:1 ratio. We want to invest in a building project of 10,000 square meters. An auction is created to digitize these 10,000 square meters at $2000 per square meter (determined by the local price), for a total of $20 million.

Scenario 1: At the end of the auction, we have a $21 million allocation. We have minted 10,000 tokens at $2100 per square meter for auction participants.

Scenario 2: We only have a $5 million allocation at the end of the auction. We have minted only 2,500 tokens.

In both scenarios, investors will receive their tokens, and the smart contract will have the allocated auction balance in the form of stablecoins or other assets as defined by the auction rules. This balance will be invested in real estate property through Quaedrant DAO or any other proxy organization holding the local legal rights to the real estate asset. In the end, the real estate asset will be used either by selling or renting it out. Any profit made will be distributed back on chain via a reverse auction. A reverse auction is a public pool containing profitable assets, ideally stablecoins. Investors who hold tokens can distribute these assets among themselves according to their share value. The protocol itself, also known as smart contracts, should remain straightforward and simple. It requires all participants to stay active as economic agents, performing actions such as voting for the tokenization of new property or participating in reward distribution.

The primary objective of the framework is to serve as a useful tool and foundation [3] for more complex systems such as auto-investment programs, automatic reward collections, and bond stability systems. Important future steps to extend the framework will include integrating additional tools such as:

- NFT tokenization of owned property, simplifying the process of auditing and transferring property on-chain.
- Quadratic funding [4], enabling all active participants to allocate protocol-owned funds towards new investment programs and tokenization auctions.

4. Tokenomics

Initially, one token will be bonded to one square meter. However, market conditions will eventually determine its fair price, potentially moving this ratio in any direction. Losing or selling property will also affect this ratio, as we are keeping the principles of new token minting straightforward.

Each token is backed by square meters of real estate that generate actual profit. Therefore, in oversold scenarios, the token's price may likely increase due to the arbitrage opportunity to purchase tokens for collecting distributed rewards.

The ideal situation maintains a 1:1 ratio of digital tokens to square meters. However, it's also important to account for potential parity divergence scenarios:

- If the quantity of digital tokens surpasses the actual square meters (for example, due to property destruction or sale), the ratio will shift. To reestablish balance, all newly minted tokens should have a decreased ratio.
- If the tangible square meters exceed the number of digital tokens (for example, due to construction or project changes leading to more space than planned), we will need to create new mint auctions to restore the balance. Profit from market volatility and other economic activities can also lead to acquiring more physical space.

Ratio between physical space and digital tokens will be key metric to understanding the overall performance of the project. Any fluctuation in this ratio is considered a positive outcome as long as we adhere to our core principles. More digital tokens indicate high demand for new digital space. Fewer digital tokens mean we have more space that we can utilize to create demand through higher revenue.

The principles of measuring property in digital square meters make it easy to project the market premium for each property. For instance, a physical property evaluated at 100 square meters, but valued as 120 digital square meters, intuitively suggests a 20% premium included in its price.

5. Conclusion

The proposed Quaedrant framework for managing real-world assets on the blockchain presents an innovative approach to real estate investment and management. It also prepares tools for a transformative shift towards a more inclusive, efficient, and transparent economic landscape. By leveraging the simplicity of tokenizing real estate assets, we democratize access to investment opportunities and increase the liquidity and management efficiency of these assets.

The combination of traditional asset management and innovative blockchain technology marks the beginning of a new economic era. It blurs the lines between the tangible and the digital, promoting a setting of increased opportunity, security, and scalability. By carefully applying this framework, we're set to see a new paradigm in asset management emerge, grounded in accessibility, transparency, and community engagement.

Looking ahead, the Quaedrant project is a fundamental disruption tool, paving the way for future innovation in asset management across various sectors. The proposed framework provides a solid foundation for further advancements, including NFT tokenization for streamlined auditing and property transfers, and the inclusion of quadratic funding to enable community-driven investment decisions. As we refine and broaden the application of this framework, we invite stakeholders from all areas to use these tools in shaping a future where real-world assets are managed with unmatched efficiency, transparency, and inclusivity. Optimizing existing markets, redefining them with modern technological tools, and improving operational efficiency, drive growth and prosperity in the digital age.

References

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