ISSN: 1648-715X / eISSN: 1648-9179

VILNIUS TECH
Vilnius Gediminas Technical University

INTERNATIONAL JOURNAL OF STRATEGIC PROPERTY MANAGEMENT

2025
Volume 29
Issue 4
Pages 297–315
https://doi.org/10.3846/ijspm.2025.24814

TOKENIZATION AND THE FUTURE OF PROPERTY INVESTMENT: A NEW PARADIGM FOR REAL ESTATE

Asmae EL JAOUHARI[1], Ashutosh SAMADHIYA[2], Anil KUMAR[3*], Hemakshi CHOKSHI[3], Audrius ŠEŠPLAUKIS[4], Saulius RASLANAS[4]

[1] *National School of Applied Sciences, Hassan First University, Berrechid, Morocco*
[2] *Jindal Global Business School, OP Jindal Global University, Sonipat, India*
[3] *Guildhall School of Business and Law, London Metropolitan University, London, UK*
[4] *Department of Construction Management and Real Estate, Vilnius Gediminas Technical University, Vilnius, Lithuania*

Article History:
- received 11 April 2025
- accepted 1 August 2025

Abstract. Tokenization has improved liquidity, access to markets and ownership models for real estate investments. This research aims to analyze applications, enablers and challenges of tokenization by conducting a systematic literature review of 75 peer-reviewed journal articles that discuss real estate tokenization using the Technology-Organization-Environment (TOE) framework. The findings show that tokenization allows more efficient markets with automation, transparency, and liquidity; new investment methods in real estate, such as crowdfunding and fractional ownership; and reductions of any limits of traditional real estate through the reduction of costs, faster transactions, and higher investor engagement. Nevertheless, there are still barriers to real estate tokenization including technological risks, regulatory fragmentation, and the reluctance of organizations towards decentralized asset structures. These are supported by the literature review findings. These barriers highlight the necessity of investor education, technology standardization, and regulatory harmonization with the aim of promoting wider adoption. This paper lays the groundwork for future research into risk management, scalability, and institutional integration of real estate tokenization by highlighting important gaps in existing literature and consolidating previous studies. Ultimately, even though tokenization has a lot of potential to change the real estate market, its long-term success depends on the development of accurate legal frameworks and the seamless incorporation of tokenized assets into conventionnel financial systems.

Keywords: real estate tokenization, property investment, liquidity, fractional ownership, systematic literature review, TOE framework.

*Corresponding author. E-mail: *a.kumar@londonmet.ac.uk*

1. Introduction

Real estate is widely agreed to be one of the primary drivers of economic growth and a crucial indicator of the health and prosperity of a nation or region (El Jaouhari et al., 2024; Maioli & Livingstone, 2025). The real estate industry makes a substantial contribution to an economy for several reasons; in a nutshell, this sector offers job opportunities for a large portion of the population and raises both individual and national profits. As per Savills report[1], by the end of 2022, the market value of all real estate worldwide was $379.7 trillion, with real estate about four times the size of the global gross domestic product (GDP); it is worth more than the combined value of the global bond and equities markets. Notwithstanding its economic and social importance, the real estate sector not only focuses on value creation and money circulation, but it can additionally serve as a major cause of financial crises and a means of assisting economies in recovering from the simultaneous effects of seismic crises (Shen, 2024). The real estate industry, for example, was the primary source of the 2008 global financial crisis, brought upon by the collapse of the housing bubble in the United States (Sümer, 2024). However, the industry also played a key role in the recession that followed. Further, the global real estate market is criticized as lacking liquidity and being overly opaque, given its high investment prices, expensive brokers and market circumstances that hold assets in place for a long period (Broxterman & Zhou, 2023).

Real estate tokenization (RET), which involves converting ownership rights of a physical asset into digital tokens, is a new financial instrument resulting from the technological explosion we are experiencing, and the intersection of blockchain and real estate markets (Mottaghi et al., 2024). With RET, the real estate market opens up to several new

[1] https://www.savills.com/impacts/market-trends/the-total-value-of-global-real-estate-property-remains-the-worlds-biggest-store-of-wealth.html

possibilities. Tokenization can increase the liquidity of real estate assets through fractional ownership in a real estate market that has traditionally excluded smaller investors (Zhang et al., 2024b; Tanveer et al., 2025). Chow and Tan (2021) specifically identify how tokenization could democratize investment opportunities through lower entry barriers. They explore the idea of tokenization as a means to increase inclusivity for the real estate market in the Asia-Pacific (APAC) region. Liu and Chen (2025) also discuss the potential of blockchain-based tokenization to create a well-established paradigm around Real Estate Investment Trusts (REITs); this may drive real estate investment appeal through secondary market trading, similar to stocks. According to Yusof et al. (2023), blockchain, big data, and artificial intelligence (AI) can all be used to democratize Islamic home financing by providing a tokenization model that combines sustainability, marketability, and liquidity for homeowners.

Significant and diverse developments result from tokenization, including the ability to transfer fractional ownership shares, enable digital ownership, and, perhaps most importantly, improve liquidity as real estate tokens can be traded on cryptocurrency exchanges, offering a more liquid option than traditional investments (Dutta, 2020; Garcia-Teruel & Simón-Moreno, 2021). Individual investors can develop diversified real estate portfolios by using real estate tokens, thus removing trading restrictions in real estate (Rogers & Dutta, 2020). Furthermore, investors identify real estate as an industry that is well-suited to blockchain tokenization (Abualhamayl et al., 2024). Along with the benefits of current forms of indirect investment, investors can benefit from this new type of investment through elimination of a number of issues related to direct investments (Spiga et al., 2024). Likewise, fractional ownership is made possible by properties' ability to be divided into numerous separate tokens (Mottaghi et al., 2024). As a result, regular investors can now acquire assets that were previously inaccessible, allowing them to diversify their holdings. Consequently, the digital equivalent of owning real estate is represented by real estate tokens (Aharon et al., 2024). The value of RE objects can be transformed into a more liquid form through the usage of tokens (Yousaf et al., 2024). Tokenization can therefore help to stabilize the cryptocurrency economy and lessen market volatility by associating tokens with real assets (Maioli & Livingstone, 2025).

Despite its great potential, tokenization in real estate is hindered by a number of issues. Regulatory frameworks continue to be a major obstacle (Simons & Simons, 2022). According to Nagl et al. (2024) and Abdullah et al. (2023), investors and developers face legal uncertainty as existing property rules are ill-prepared to handle digital tokens that represent ownership rights. However, as pointed out by Kumar et al. (2025), scalability of blockchain-based platforms is another area of concern, as there are significant doubts on whether such platforms can handle real estate-related transactions. Furthermore, as highlighted by Zhang et al. (2024b), even though RET offers a significant level of liquidity for property investments, risks for investors, including the volatile nature of token prices and the lack of secondary market development, remain major concerns. Therefore, these aforementioned aspects reveal that despite its potential, the technology is still in its initial stages and needs substantial development in terms of technological infrastructure and regulatory frameworks. The varying views of different groups concerning the technological, legal and financial aspects of RET illustrate the need for an extensive systematic review that can consolidate and aggregate the body of current knowledge. By demonstrating the benefits that tokenization can provide to real estate performance, this study initiates a scholarly investigation into the relationship between real estate and tokenization with the goal of clarifying the transformative potential, barriers, and opportunities in this dynamic environment through the following research questions (RQs):

RQ1. What are the main applications of RET?

RQ2. What are the perceived drivers and barriers of RET?

RQ3. What are the research gaps, opportunities and future directions for adoption of RET?

By addressing these RQs, the review aims to provide a deeper knowledge of how tokenization can alter the real estate sector and how various stakeholders might be affected; significant trends and key opportunities will be identified for further research through a literature review. As a result, the study makes multiple contributions to current literature. Initially, the results of this study can be used by policymakers and real estate stakeholders to map strategies for adopting cost-effective use of tokenization for property valuation practice by identifying the main drivers and barriers that will discourage and/or encourage the adoption of RET. This provides an opportunity to use the study's findings to better prepare the real estate sector to face comparable challenges, such as those in developing nations, for the adoption of tokenization. Further, stakeholders in the sector may more effectively use this technology to promote innovation and generate value for all parties involved by raising awareness of the potential and challenges of RET. The structure of the paper is as follows. Section 2 reviews relevant literature. The research method is described in Section 3. Section 4 summarizes the crucial drivers behind and barriers to RET. Building on this, Section 5 includes a thorough discussion outlining the theoretical and practical implications, proposing potential avenues for further research, and highlighting the limitations of the research. Finally, conclusions are given in Section 6.

2. Literature review

2.1. Real estate tokenization

Real estate tokenization is a revolutionary process that digitizes real asset ownership using blockchain technology, enabling fractional ownership, liquidity, and global access (Chow & Tan, 2021). According to Zhang et al. (2024b),

tokenization is the process of converting ownership rights or shares of a real estate asset into digital tokens and storing them on a decentralized ledger. RET provides democratized access by allowing investors to purchase fractional ownership of real estate assets, sometimes for as little as a few dollars, as opposed to traditional real estate ownership, which requires significant investment capital and, generally, offers geographic constraints and liquidity issues (Rogers & Dutta, 2020).

Underlying blockchain technologies ensure decentralized and immutable bookkeeping, high visibility and low error-prone maintenance (Yousaf et al., 2024). Thus, RET has the potential to facilitate several functions, such as dividend distribution, rent payments, and audits with the help of smart contracts (Mottaghi et al., 2024). Smart contracts are self-executing scripts that are executed based on predefined conditions. As a result, RET helps minimize paperwork and the risk of fraud and error (Kreppmeier et al., 2023). Additionally, Ethereum-based solutions or any programmable blockchain-based protocol could integrate a token standard such as ERC-20 or ERC-721, enabling interoperability and easing the use of wallets and DeFi tools and DEXs (Loporchio et al., 2024). There are further implications of RET. By facilitating peer-to-peer trading of tokenized assets on both centralized (CEX) and decentralized platforms, market liquidity is improved in traditional real estate markets (Liu & Chen, 2025). As for the market research future[2], the tokenization market is anticipated to develop at a rate of around 13.42% between 2025 and 2035. In this regard, RET is positioned to become a systemic improvement to traditional investment strategies as well as a financial innovation.

However, clear regulations and supportive institutional frameworks are necessary for RET's implementation. According to Steininger (2023), cross-jurisdictional compliance procedures, land registries for property digitization, and safe digital identity verification are necessary for widespread RET adoption. These foundations protect issuers and investors by ensuring that RET complies with know-your-customer (KYC) and anti-money laundering (AML) regulations (Alnabulsi, 2024). Furthermore, the value proposition of RET aligns with the larger shift towards Web3 economies, where asset ownership is becoming more programmable and decentralized (Khamisa, 2021). In this context, RET offers new forms of governance, valuation, and cooperation through its intersections with metaverse real estate, decentralized autonomous organizations (DAOs), and real-world asset (RWA) financing (Turi, 2023). As a result, tokenized real estate not only challenges established investing paradigms but also advances the development of digital capitalism.

[2] https://www.marketresearchfuture.com/reports/tokenization-market-3206

2.2. Applications of tokenization within the real estate sector

Tokenization has emerged in the real estate sector over the past few years as a disruptive technology that is upending acquisition, disposal, and management of real estate property assets (Swinkels, 2023). Tokenization is the process of representing ownership rights for a real estate asset in a digitized format to express those ownership rights as a token on a blockchain (Dutta, 2020). In this way, these tokens add extra liquidity, accessibility, and efficiency to real estate markets, where they can operate as digital securities that may be owned, traded, or transferred within decentralized financial ecosystems (Kreppmeier et al., 2023). At the core of tokenization is the concept of fractional ownership, which allows real estate assets to be split into smaller (and tradeable) pieces that can be expressed as tokens on a blockchain (Mottaghi et al., 2024). The emergence of tokenization allows for infinitely more flexible ownership structures, enabling investors to purchase a proportion instead of the entire asset as is required in conventional real estate transactions with substantial cash investments and the complexity of legal instruments (Choi et al., 2024). Tokenization not only creates more frequent transactions to support a vibrant market but also diversifies the investment base (Margret & Julie, 2024).

Tokenization also plays a vital role in improving real estate transactions. Tokenization allows the creation of a transparent and decentralized asset trading environment using blockchain technology (Langaliya & Gohil, 2023). A real estate transaction involves a number of third parties, including banks, lawyers, and real estate brokers who are involved in the process of the transfer of property and documentation of the ownership records (Zhitomirskiy et al., 2023). Due to the tamper-proof ledger of blockchain, which stores ownership records and transaction history in a safe and traceable manner, tokenization decreases the role of third parties in the transaction process (Swinkels, 2023). This minimizes the chances of fraud and increases transparency, while accelerating the process of settlement (Kreppmeier et al., 2023). Furthermore, by combining smart contracts which execute essential tasks involved in the transfer of assets and management of properties, tokenization enables the creation of programmable ownership systems (Mottaghi et al., 2024). By employing smart contracts, terms of a contract such as rent agreement, revenue share, or transfer of properties can be executed when certain criteria are fulfilled automatically, since they follow predetermined rules to regulate the transaction (Ullah & Al-Turjman, 2023). This improves the management of real estate assets and provides a methodical approach to enforce compliance without human intervention (Liu & Chen, 2025).

Zhitomirskiy et al. (2023) suggest that tokenization presents new financial possibilities within real estate markets, specific to direct ownership in real estate markets. Within decentralized finance (DeFi) ecosystems, tokenized

real estate assets can be used as collateral for loans, can facilitate peer-to-peer loans, or can facilitate trading on a secondary market in the form of a digital exchange (Tanveer et al., 2025). In addition, tokenization creating a connection between digital financial markets and real estate products enhances the real estate investing sector more broadly, allowing for more asset utilization in financial conduct than just standard leases and sells (Sternik & Safronova, 2021). As a result, tokenization presents an opportunity in real estate, to not only increase market efficiency but produce more price discovery. Market valuations created from tokenized assets traded on blockchain-enabled platforms can simply be based on persistent market commotion instead of random evaluations or determined estimates (Avci & Erzurumlu, 2023). Finally, a constant overlapping of asset performance, ownership, and liquidity enables more accurate pricing mechanisms and better investment decisions (Liu & Chen, 2025). To conclude, this big data focused approach presents a minimized information avenue for investors, purchasers, and sellers (Treleaven et al., 2021), while also improving transparency in the market overall.

2.2.1. Investment democratization and fractional ownership

One of the key applications of tokenization in property is fractional ownership, as this enables new types of investment vehicles and significantly lowers the barriers of entry for investors, democratizing access to real estate assets (Maioli, & Livingstone, 2025). Traditionally, high-net-worth individuals and institutional investors are the main participants in real estate transactions due to the capital requirements (Treleaven et al., 2021). Tokenization of an asset puts a digital split on the ownership of the asset by taking an original real estate asset and dividing it into fractional digital shares, allowing a broader array of investors to own real estate (Mottaghi, et al., 2024). Blockchain fractionalization allows individuals to own fractional ownership in a property without significant financial contribution, receive passive income (rent) on that ownership while appreciating in value (Liu & Chen, 2025). It is also evident that tokenization further enhances the real estate crowdfunding structure by allowing multiple people to pool their funds and own properties (Tanveer et al., 2025). As this structure permits investors to capitalize in many tokenized assets and not just a single asset, it promotes access to a wider market with increased diversification (Zhang et al., 2024b). Furthermore, the emergence of tokenized REITs increases the options for investing as it reduces the amount of traditional financial intermediaries, creating liquidity and access to real estate markets (Liu & Chen, 2025). In developing countries, where funding restrictions have previously limited the development of real estate and investments, there is now the opportunity to acquire shares in property as well (Starr et al., 2020).

2.2.2. Real estate liquidity

Real estate is one of the least liquid assets, as purchasing or selling real estate takes time and effort, sometimes over years (Avci & Erzurumlu, 2023). Tokenization allows the creation of a secondary market where real estate tokens are traded similarly to stocks or bonds (Chow & Tan, 2021). This new solution enables investors to buy and sell fractional ownership of properties quickly using blockchain-based platforms (Liu & Chen, 2025). The P2P property token marketplaces also increase the liquidity of the market, as it allows an investor to trade tokenized real estate without a traditional broker or financial institution (Liu & Chen, 2025). Real estate sales become cheaper and more accessible for people using this method. Furthermore, it does not involve intermediaries, thus reducing transaction costs (Yusof et al., 2023). Automated market-making processes powered by smart contracts guarantee real-time price discovery and continuous trading of tokenized assets, both of which enhance liquidity and market efficiency (Zhu et al., 2024). Similarly, because tokenization enables permanent and verifiable records of transactions with blockchain, pricing transparency is enhanced (Garcia-Teruel & Simón-Moreno, 2021). Investors can receive an up-to-date appraisal of their property based on historical transaction data and market demand, effectively improving pricing accuracy and reducing information asymmetry (Kreppmeier et al., 2023).

2.2.3. Automated real estate transactions-based smart contracts

Real estate can be tokenized, making it easier to automate and streamline processes without having to rely on conventional legal and financial brokers (Dutta, 2020). As described by Avci and Erzurumlu (2023), a smart contract is a self-executing agreement that is written in the blockchain and automatically executes a transaction when predetermined conditions are met. Some examples of real estate transactions that can be handled through smart contracts include the sale of a property, leasing agreement, escrow service, and payment of rent money (Uchani Gutierrez & Xu, 2023). For instance, smart contracts in real estate transactions automate processes such as confirming a buyer's identity, payment processing, and updating land registry once a transaction is finalized (Huh & Kim, 2020). Automating the ownership transfer process saves time and reduces costs associated with the manual processing of paperwork (Timuçin & Biroğul, 2023). In addition, smart contracts can be utilized to create tokens and handle rental agreements, ensuring that rent payments are collected/disbursed to property owners or other shareholders in an immutable and transparent manner (Liu & Chen, 2025). Moreover, smart contracts provide a high level of security and confidence in real estate transactions (Jeong & Ahn, 2021). Equally, fraudulent activities such as double selling or property title meddling is significantly reduced, and disputes are eliminated, because all contract terms and conditions are recorded on an immutable blockchain ledger (Saari et al., 2022).

2.2.4. Tokenized mortgage and real estate funding

Tokenization offers a new way to raise capital and fund mortgage loans (Liu & Chen, 2025). The traditional mortgage procedure is time-consuming and requires extensive paperwork, credit checks, and third-party approvals (Garcia-Teruel & Simón-Moreno, 2021). However, tokenization enables alternative methods of finance to be applied, such as decentralized lending platforms that allow real estate-backed tokens to be used as collateral (Saari et al., 2022). Tokenization of mortgages is one of the most common applications of this technology, in which the token is issued as a debt security to represent a mortgage (Dutta, 2020). A blockchain platform facilitates the trade of mortgage-backed tokens, giving borrowers better options for financing and allowing investors to participate in the real estate debt market (Liu & Chen, 2025). Additionally, decentralized finance (DeFi) lending mechanisms, which allow individuals to receive real estate loans utilizing tokenized properties as collateral, are now available without requiring individuals to obtain loans from banks or financial institutions (Sockin & Xiong, 2023). The issue of real estate-backed stablecoins – digital assets supported by property values – is yet another novel approach (Wong et al., 2024). In this manner, stablecoins create financial inclusion across borders that involve real estate transactions, as well as various possibilities for international buyers interested in purchasing properties in foreign territories. Tokenization-based lease-to-own initiatives also allow a more inclusive path to homeownership, as tenants can begin to achieve ownership by creating tokenized payment plans to obtain ownership of properties (Sunyaev et al., 2021).

2.2.5. Blockchain-powered property rights administration and land registry

Tokenization advances property rights management and helps combat fraud through blockchain technology applications in land registrations (Soner et al., 2021). Past methods of registering land titles have been mostly ineffective, subject to hacking, and controversial (Thakur et al., 2020). Tokenization registers property title ownership and previous transactions on an immutable ledger of blockchain so that land titles are transparent, impractical to hack, and easily verifiable (Zhitomirskiy et al., 2023). Since every previous transaction is recorded and validated, a blockchain-based land registry removes the possibility of fraudulent land sales (Konashevych, 2020). The utility of a blockchain-based land registry is especially beneficial in locations where property ownership and property rights can be subject to dispute, such as regions that lack a strong legal enforcement system, or have higher levels of corruption (Thakur et al., 2020). Not just owning property, but further digital notarization of real estate document on a blockchain, assists in establishing legality and validity (Dias Menezes et al., 2023). Blockchain also improves cross-border real estate transactions, as it supports international investment in real estate and enables verification or clarity of real property rights (Saari et al., 2022). Also, smart contracts can automate dispute settlements or resolution procedures, which can further simplify transactions and reduce legal drama (Timuçin & Biroğul, 2023).

2.2.6. Tokenizing assets for portfolio management

The exciting potential for tokenized real estate assets to offer improved liquidity, diversification, and portfolio optimisation, is more fully recognised by institutional investors (Avci & Erzurumlu, 2023; Kreppmeier et al., 2023). Tokenized real estate funds provide institutional investors with the ability to access global real estate markets, reducing any barriers to access (Yusof et al., 2023). Tokenized real estate funds allow investors to trade instantly via blockchain-enabled platforms and to own fractions of real estate assets (Choi et al., 2024). Furthermore, tokenized

Table 1. Applications of tokenization in real estate

Stakeholder level	Key application	Specific focus areas	Description	References
Industry-wide	Investment democratization and fractional ownership	Real estate tokenized shares	Democratizing real estate investing by lowering barriers to financial entrance and enabling fractional property ownership	(Mottaghi et al., 2024; Maioli & Livingstone, 2025; Tanveer et al., 2025)
		Platforms for crowdfunded real estate	Allowing small investors to take part in high-value markets by facilitating pooled investments in tokenized properties	(Chow & Tan, 2021; Zhang et al., 2024b; Liu & Chen, 2025)
		Digital real estate investment trusts	Improving the liquidity and efficiency of real estate markets by enabling investors to trade tokenized shares of REITs	(Dutta, 2020; Garcia-Teruel & Simón-Moreno, 2021; Yusof et al., 2023)
		Emerging market micro-investments	Promoting access to real estate investments in emerging markets by using micro-investment models based on blockchain technology	(Rogers & Dutta, 2020; Spiga et al., 2024; Abualhamayl et al., 2024)
		Cross-border investment in real estate	Simplifying foreign real estate investments by lowering financial and regulatory barriers to entrance	(Simons & Simons, 2022; Aharon et al., 2024; Yousaf et al., 2024)

End of Table 1

Stakeholder level	Key application	Specific focus areas	Description	References
Investors and asset holders	Real estate liquidity	Trading real estate peer-to-peer (P2P)	Developing decentralized markets with open trading for tokenized properties	(Abdullah et al., 2023; Nagl et al., 2024; Kumar et al., 2025)
		Market-making automation	Ensuring ongoing trade liquidity and real estate asset pricing through the use of smart contracts	(Kreppmeier et al., 2023; Swinkels, 2023; Choi et al., 2024)
		Real-time appraisal and price discovery	Optimizing the precision and openness of property appraisal by utilizing blockchain transaction data	(Ullah & Al-Turjman, 2023; Zhitomirskiy et al., 2023; Margret & Julie, 2024)
		Market liquidity for private equity investors	Reducing the barriers that prevent small investors from investing in high-value real estate markets	(Sternik & Safronova, 2021; Treleaven et al., 2021; Avci & Erzurumlu, 2023)
Real estate transactions	Automated real estate transaction-based smart contracts	Automated real estate transactions and sales	Utilizing self-executing smart contracts to facilitate direct property transactions and ownership transfers	(Sunyaev et al., 2021; Saari et al., 2022; Wong et al., 2024)
		Blockchain-driven rental contracts	Ensuring that leasing agreements on the blockchain are automated, tamper-proof, and transparent	(Arcenegui et al., 2023; Crandall, 2023; Zook & McCanless, 2025)
		Automated property administration	Leveraging blockchain-based smart contracts to track expenses and distribute rental income in real time	(Steininger, 2023; Zhu et al., 2024; Maioli & Livingstone, 2025)
Real estate financing	Tokenized mortgage and real estate funding	Tokenized mortgage securities	Enhancing the liquidity of markets for mortgage-backed securities by converting real estate debts into digital tokens	(Kreppmeier et al., 2023; Swinkels, 2023; Choi et al., 2024)
		Decentralized Finance (DeFi) property loans	Enabling lending without the need for intermediaries against tokenized property assets	(Abdullah et al., 2023; Nagl et al., 2024; Kumar et al., 2025)
		Blockchain-driven loan underwriting	Improving loan risk assessment by the use of transaction history for transparent real estate tokens.	(Simons & Simons, 2022; Aharon et al., 2024; Yousaf et al., 2024)
		Real estate crowdlending	Using blockchain-based real estate-backed crowdfunding mechanisms to link lenders and borrowers	(Rogers & Dutta, 2020; Abualhamayl et al., 2024; Spiga et al., 2024)
Regulatory and legal systems	Blockchain-powered property rights administration and land registry	Tamper-proof real estate ownership records	Providing immutable records of property ownership, preventing fraud and title issues	(Dutta, 2020; Garcia-Teruel & Simón-Moreno, 2021; Yusof et al., 2023)
		Automated title transfers	Facilitating seamless title transfers using land registries coupled with blockchain technology	(Chow & Tan, 2021; Zhang et al., 2024a; Liu & Chen, 2025)
		Smart real estate taxation	Automating computation and payment of property taxes using blockchain	(Mottaghi et al., 2024; Maioli & Livingstone, 2025; Tanveer et al., 2025)
Institutional investors	Tokenizing assets for portfolio management	Tokenized real estate assets funding	Giving institutional investors the ability to use tokenized real estate investments to diversify their portfolios	(Arcenegui et al., 2023; Crandall, 2023; Steininger, 2023)
		Blockchain-based analytics for market knowledge	Optimizing real estate investment decision-making by leveraging blockchain data	(Sunyaev et al., 2021; Wong et al., 2024; Zook & McCanless, 2025)
		Risk management with tokenized derivatives	Enabling the use of options, futures, and other risk-hedging mechanisms backed by real estate	(Treleaven et al., 2021; Saari et al., 2022; Avci & Erzurumlu, 2023)
		Property tokens basket funds	Enabling investors to own a variety of tokenized assets from various real estate markets	(Sternik & Safronova, 2021; Ullah & Al-Turjman, 2023; Zhitomirskiy et al., 2023)
		Automated rental yield distribution	Ensuring efficient profit-sharing procedures for investment funds in real estate	(Kreppmeier et al., 2023; Choi et al., 2024; Margret & Julie, 2024)

real estate funds offer risk adjusted yield optimization from blockchain analyses of market trends and performance of properties (Dutta, 2020). Institutional investors are able to place tokenized real estate assets into their traditional financial systems and gain integration with blockchain-enabled investments and traditional capital markets (Abualhamayl et al., 2024). In addition, real estate derivatives, including tokenized options and futures, give large investors the means to hedge and mitigate risk (Zook & McCanless, 2025). Table 1 outlines a thorough analysis of the main applications, describing specific tokenization features for real estate performance.

2.3. Tokenization: Real estate solutions

RET uses blockchain technology to remedy structural inefficiencies. Solutions improve operational efficiency, liquidity, accessibility and transparency (Ali et al., 2025). Tokenization facilitates access to real estate investments by allowing fractionally owned asset classes which lowers capital barriers and allows ownership in larger value dollars for fractional proportions (Yusof et al., 2023). This approach also allows for customisation and flexibility as an investor can select particular asset classes, risk profiles, and periods of participation to adapt their portfolios, hopefully leading to better risk management and diversification (Manahov & Li, 2025). Additionally, tokenization fosters crowdfunding, lessens reliance on institutional finance, and provides liquidity for real estate development projects by allowing many investors to pool their funds into tokenized assets (Steininger, 2023). Furthermore, tokenization automates transactions with smart contracts and removes the roles of brokers, banks, and escrow providers, reducing fees and administrative tasks while also accelerating settlement (Arcenegui et al., 2023). Crandall (2023) states that this simpler process increases flexibility with easier, borderless transactions and fewer regulatory hurdles to foreign investment. Additional operational efficiency to tokenized real estate is provided through automated property management from the combination of AI and the Internet of Things (IoT) regarding lease automation, predictive maintenance, and real time asset monitoring (Starr et al., 2020). In addition, blockchain's immutable ledger enhances transparency, provides verifiable ownership records, reduces fraud risk, and raises investor confidence (Zook & McCanless, 2025). Since secondary markets

Table 2. Tokenization-based solutions for real estate performance

Solution	Description	Benefits	Challenges mitigated	References
Fractional ownership	Real estate assets can be fractionalized into small tokens due to blockchain technology; this lowers administrative expenses and makes ownership possible for individual investors	Providing liquidity Minimizing capital requirements Enabling fractional ownership at low cost	High capital expenditure Administrative obstacles in fractional ownership structures	(Simons & Simons, 2022; Aharon et al., 2024; Yousaf et al., 2024)
Customization	Tokenization enables developers to provide investors with highly configurable options by creating several investment tranches with different risk profiles, rights, and benefits	Customized investment prospects Increased portfolio diversity Investment type flexibility	Limited opportunities for investing in conventional real estate models	(Abdullah et al., 2023; Nagl et al., 2024; Kumar et al., 2025)
Crowdfunding	Tokenization makes crowdfunding easier and expands the pool of potential investors by facilitating worldwide peer-to-peer lending and financing through the use of blockchain technology	Enhanced investor pool base Higher capital raised for major projects Worldwide investors access	Geographical restrictions on conventional real estate financing	(Kreppmeier et al., 2023; Swinkels, 2023; Choi et al., 2024)
Disintermediation	Tokenization enhances transaction efficiency through the removal of intermediaries (such as brokers) and reductions in administrative and regulatory costs	Reduced transaction costs Faster transactions Improved developer accessibility	High costs and lengthy paperwork in conventional real estate deals	(Ullah & Al-Turjman, 2023; Zhitomirskiy et al., 2023; Margret & Julie, 2024)
Flexibility	Ownership rights over real estate assets can be divided into units that may be modified to allow diverse ownership structures (e.g. timeshare, joint ownership, syndications) with varied rights and contractual implications	Customized investor involvement Flexible investment structures development Increased liquidity	Rigidity of conventional real estate ownership arrangements	(Sternik & Safronova, 2021; Treleaven et al., 2021; Avci & Erzurumlu, 2023)
Operational efficiency	Blockchain reduces operational inefficiencies by streamlining real estate transactions using smart contracts that manage compliance, record-keeping, and profit sharing	Increased accuracy and accessibility Decreased administrative load Enhanced transaction pace	Time-consuming, intricate procedures in conventional real estate transactions	(Sunyaev et al., 2021; Saari et al., 2022; Wong et al., 2024)

End of Table 2

Solution	Description	Benefits	Challenges mitigated	References
Settlement time	Real estate transactions on blockchain platforms can be completed almost immediately thanks to tokenization, removing lengthy settlement delays	Reduced settlement times Enhanced liquidity	Delays in traditional real estate market settlement procedures	(Arcenegui et al., 2023; Crandall, 2023; Zook & McCanless, 2025)
Transparency	Blockchain tokenization improves transparency by providing real-time, easily available data on ownership records, asset quality, and contractual specifics	Enhanced investor trust Decreased information asymmetry Critical data ease of access	Outdated information and a lack of openness in conventional real estate markets	(Steininger, 2023; Zhu et al., 2024; Maioli & Livingstone, 2025)
Liquidity	Investors can acquire and sell tokenized real estate assets with ease as they can be swiftly carried out on secondary markets	Improved market liquidity; larger pool of investors Easier access to projects funding	Traditional real estate assets' illiquidity	(Kreppmeier et al., 2023; Swinkels, 2023; Choi et al., 2024)
Access to broader investor base	Tokenization systems are accessible to investors worldwide, eliminating geographical restrictions and offering 24/7 access	Expanded market reach Enhanced opportunities for younger, tech-savvy investors Improved investor diversity	Restricted investor access and geographic reach in conventional real estate markets	(Abdullah et al., 2023; Nagl et al., 2024; Kumar et al., 2025)

facilitate real-time trades, tokenized real estate also has a potential liquidity advantage that lowers the traditional barriers of physical real estate assets (Sunyaev et al., 2021). Similarly, tokenization also increases the pool of possible investors by allowing access to retail investors who were previously excluded from high-value real estate markets due to financial and regulatory limitations (Wong et al., 2024). Table 2 provides an overview of the general solutions that tokenization has the potential to provide to real estate transactions.

3. Research method

3.1. Systematic literature review process

Our study contextualizes the body of research regarding tokenization of real estate properties. We start by conducting a systematic literature review (SLR) of the chosen area of expertise. A systematic review process generally consists of three primary steps – selecting and defining your keywords, browsing the academic databases to uncover what has already been published, compiling this knowledge in a comprehensive, systematic manner (Thomé et al., 2016). Having an organized structure allows for a systematic approach to filling out what has previously been done, what has been speculated upon, and what requires research. We achieve this through a combination of systematic review method procedures based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) process (Hamel et al., 2021) and the thematic analysis process. Systematic review methods are a good source of information for identifying research premised on trend analysis, whilst also allowing for the transparency and replicability of finding and flagging paper relevance (O'Dea et al., 2021; Page et al., 2021). Figure 1 is a pictorial representation of the PRISMA process employed for this study; this demonstrates the formalized approach taken to locate, screen, and extract relevant literature. Besides identifying common themes and trends surrounding tokenization in real estate, thematic analysis is used to analyze the potential literature (Castleberry & Nolen, 2018). This approach makes it possible to examine considerations such as applications in the area, the considerations driving the research, barriers, and opportunities for future research. The findings are organized to directly answer the research questions, with the use of thematic analysis providing clarity on common perspectives as well as gaps in the literature. This mixed-methods approach allows for a complete assessment of the breadth and depth of literature on RET (Mishra & Mishra, 2023).

3.2. Study selection and evaluation

This step involves deciding which search engine to use and which search strings to employ. The articles in this step are extracted from the Scopus and Web of Science (WOS) databases, which are considered the largest and best databases for peer-reviewed paper publications (Singh et al., 2021). Well-known publishers such as IEEE, Emerald Insights, Taylor & Francis, Springer, Elsevier, Wiley, and Inderscience are included in WoS and Scopus. As suggested by previous research (Liu & Chen, 2025; Mottaghi et al., 2024), the list of keywords is formed. To construct the search queries, the Boolean operators "AND," "OR," and "NOT" are employed to combine two sets of strings. Keywords related to real estate are included in the first set. To avoid overlooking any relevant

papers, the words "real estate," "property asset," "home," and "house" are included. For keywords related to tokenization, the keywords "tokenization," "token," "distributed ledger," "blockchain," and "smart contract" are included in the second set. This search term is intended to locate articles that specifically discuss tokenization in relation to real estate and related domains such as housing, property assets, or house ownership.

The search is restricted to peer-reviewed journal articles published in English and having an Scimago Journal Rank (SJR) or Journal Citation Reports (JCR) impact index. This ensures that only academically validated research is contained in the review. Assuring that studies included in the literature review are thoroughly checked adds quality and credibility to the work as it shows that findings are based on vetted research only (Page et al., 2021). Additionally, using a systematic search string limits the potential for excluding important research by documenting where the most relevant literature arises in addition to limiting language and publication type (Carrera-Rivera et al., 2022). The search includes both conceptual and empirical research that contribute to an understanding of tokenization adoption in real estate or related concepts such as tokenizing properties. To facilitate the review process, the title, abstract, keywords and full text of each publication are assessed to ensure that each publication touches on significant concepts stipulated in the study framework (Moher et al., 2010). Although cryptocurrencies were first founded in 2008, research specifically on tokenization of real estate began to appear only in 2020. Academic research has minimized the acknowledgment of the potential for blockchain technology in the real estate sector. The subject of real estate tokenization has largely been ignored until recently.

The exclusion parameters introduced are equally strict to ensure quality and focus. Studies that do not relate to the research questions or that are somewhat related to the overarching tokenization in real estate, are excluded. As a means of guaranteeing that only academically validated research is examined – a standard procedure to guarantee high-quality literature reviews – grey material, such as reports, dissertations, and non-peer-reviewed sources, is excluded (Snyder, 2019). Duplicate research is also eliminated to prevent analysis redundancy. Following the application of these criteria, each selected paper is subjected to a thorough assessment of its methodological soundness and relevance, guaranteeing that the results match the goals of the study and make significant contributions to the field of RET (Tranfield et al., 2003).

3.3. Screening and eligibility assessment results

Using predetermined search criteria, 806 articles are first identified in WoS and Scopus databases, as shown in Figure 1. 307 papers are obtained after removing 499 duplicate papers. Then, 190 potentially relevant studies are obtained from 236 records that pass title/abstract screening and non-eligible publication categories (such as conference papers and proceedings, book chapters, research reports, pre-prints, editorials, PhD and master's theses and non-English publications). 115 papers are excluded from the full-text review as they do not meet the study's research goals or have no empirical or conceptual emphasis on RET. The final result of this assessment produces 75 publications that encompass both conceptual and empirical research on tokenization in real estate.

3.4. Reporting and using results

The last step is to present the findings; this includes all the data extracted from the systematic review literature and a discussion of these findings to uncover any research gaps that can be used to establish guidelines for further study using the content analysis approach (Denyer & Tranfield, 2009; Cohen et al., 2017). At this point, a qualitative analysis employing thematic synthesis and content analysis is used to outline the findings.

The RET-related articles (2020–2025) yearly distribution identified in this SLR – 75 papers – is shown in Figure 2. Although the whole corpus shows the range of study, the pattern from year to year highlights the field's dynamic expansion and emphasis changes. The data shows a consistent increase in production, with a peak of 20 articles in 2023 compared to six in 2020, indicating growing corporate and scholarly interest in RET. Although there are fewer publications in 2025 to date, this is due to incomplete yearly data (as of March 2025) and does not contradict the general growing trend seen in previous years.

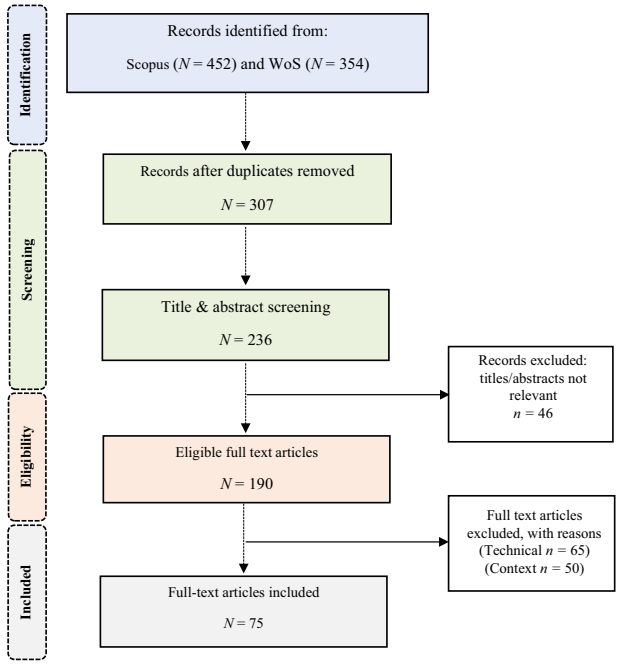

Figure 1. Process of the applied systematic literature review

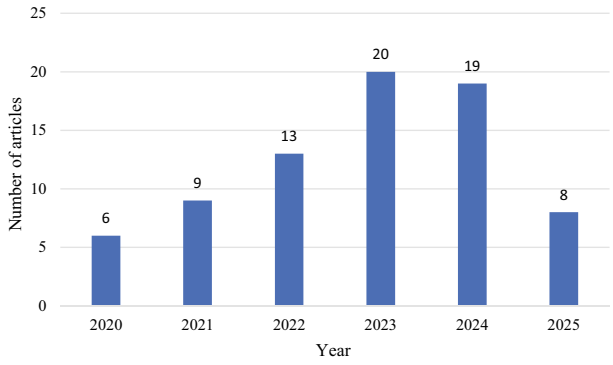

Figure 2. Number of publications year-wise

3.5. Theoretical framework

The study leverages the Technology-Organization-Environment (TOE) framework (Depietro et al., 1990) as a theoretical lens to examine the emerging use of tokenization in real estate markets. The adoption of technical innovations is impacted by three interconnected dimensions according to the TOE framework – organizational (internal processes and resources), environmental (external market and regulatory pressures), and technological (innovation aspects). Tornatzky et al. (1990) stress that the interaction of organizational readiness, socio-economic background, and technical viability is critical to successful implementation. Figure 3 illustrates how these elements interact with organizational and technological features as well as the external task environment to either limit or encourage the adoption of RET. In technological innovation, Tornatzky et al. (1990) claim that there are five factors to consider for the successful use of technology, in a similar stance to the TOE framework of Depietro et al. (1990). The nature of the technology is the first factor to be considered. The nature of the users is the second consideration. Characteristics of the deployers are third. The interactions and boundaries between users and deployers are the fourth element. The technology's transaction and communication mechanism is the fifth and last feature. The TOE framework is appropriate for evaluating the factors that encourage or hinder the adoption of tokenization in property valuation since it considers the technology, the organization that plans to use it, and the environmental concerns that limit its application (Abdelwahed et al., 2025).

4. Drivers and barriers of real estate tokenization

The process of turning property rights into digital tokens on a blockchain, or RET, offers both enormous benefits and significant barriers. The factors that drive or impede this innovation are complex; they include market, regulatory, and technological aspects, as shown in Tables 3 and 4.

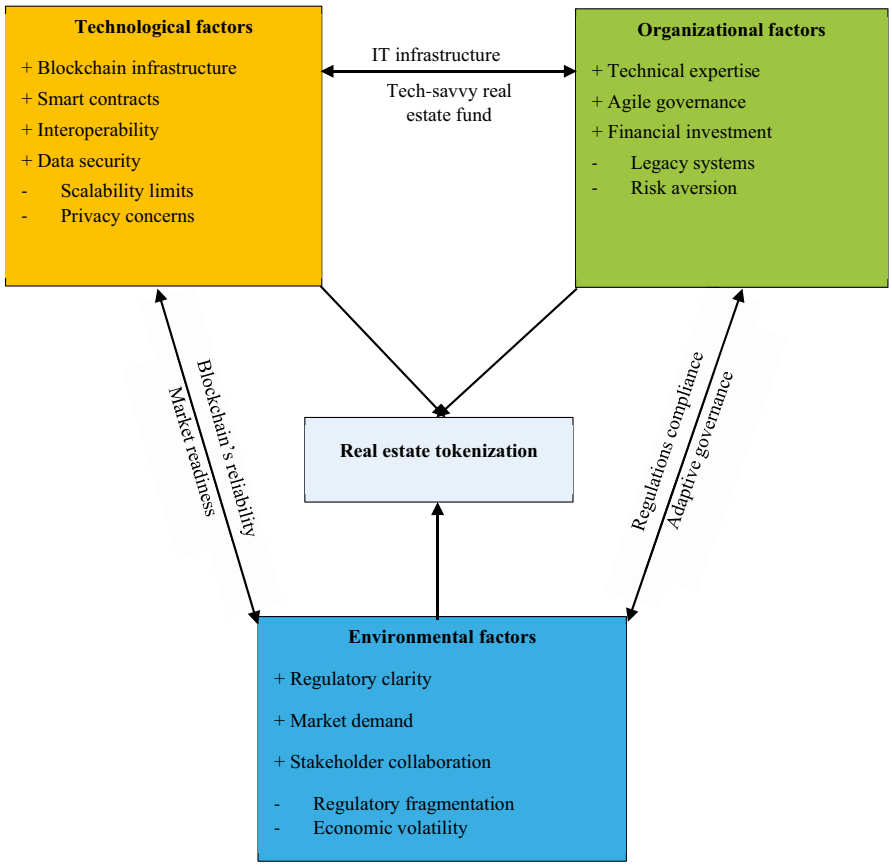

Figure 3. TOE framework in real estate tokenization

4.1. Drivers of real estate tokenization

Table 3 shows the list of the drivers of real estate tokenization. The primary drivers behind RET are the intrinsic properties of blockchain technology, which match the crucial success criteria found in the real estate and construction industries (Ali et al., 2025). The core features of blockchain are transparency, decentralization, security, data immutability, and traceability (Crandall, 2023). By enabling tamper-proof and verifiable records of ownership and transactions, these characteristics solve long-standing inefficiencies in real estate transactions, including opaque processes and fraud threats (Steininger, 2023). Furthermore, through fractionalizing high-value assets, tokenization democratizes access to real estate investments by enabling smaller capital expenditures from regular investors (Choi et al., 2024). This is demonstrated by successful examples such as the St. Regis Aspen Resort's Aspen Coin issuance, which used fractional ownership to raise $18 million[3]. Tokenization reduces intermediaries and operating expenses by streamlining procedures such as property management, secondary market trading, and crowdfunding (Arcenegui et al., 2023). Efficiency is increased by further automating compliance and transaction execution by the inclusion of smart contracts (Arcenegui et al., 2023).

4.2. Barriers to real estate tokenization

Table 4 identifies the systemic barriers that RET possesses, notwithstanding its potential. In other words, there are multiple regulatory hurdles RET needs to overcome. Authorities have continuously struggled to classify tokens as securities, and how tokens are regulated in a cross-border environment. Regulatory ambiguity is the largest challenge to emerge (Crandall, 2023; Zook & McCanless, 2025). Uncertainty requires SPV-like intermediaries to act on behalf of others in cohesive ownership structures, resulting in discouraged institutional participation and added compliance burdens (Sinha, 2023). Additionally, considering blockchain has the potential to digitally verify assets, it is limited by the tangible nature of real estate that requires property inspections and property specific valuation models (Sunyaev et al., 2021). Market-oriented challenges include limits to liquidity challenges made worse by fragmented secondary markets, as well as the volatility associated with cryptocurrency markets, reducing the value proposition and lack of assurance for investors when token valuations fluctuate in the trading cycles of crypto (Wong et al., 2024). Low demand and a discrepancy between token prices and net asset values (NAVs) plague single-asset tokenization schemes, such as those found on platforms like IPSX (Baum, 2021). This is frequently caused by the inexperienced evaluation skills of retail investors (Saari et al., 2022). Market trust is further undermined by speculative token issuances and adverse selections, as seen in failed initiatives like the Fluidity-Propellr partnership[4]. Finally, RET adoption is hampered by a lack of public knowledge and deeply ingrained customs, especially in economies like Nigeria where real estate transactions are still confidential (Adaramola, 2025).

4.3. Drivers and barriers interplay

Real estate tokenization's scalability, regulatory acceptability, and market integration are all impacted by the dynamic interaction of key drivers and enduring barriers. One of the main drivers is technological development; breakthroughs in blockchain interoperability, scalability, and cybersecurity make tokenized property transactions more feasible while alleviating worries about security flaws and network congestion (Treleaven et al., 2021). Additionally, the increasing tendency of investors showing interest in digital assets and different types of changeable portfolios encourages businesses to implement tokenized models; this reaffirms greater movements toward financial innovation and alternative investment strategies by practitioners (Avci & Erzurumlu, 2023). Adoption is enhanced by support from institutional players and regulatory experimentation in progressive jurisdictions; these support further acceptance of tokenization due to the availability of legislative frameworks that provide the legitimacy to draw in capital flows (Sternik & Safronova, 2021). Nonetheless, there are significant barriers that mitigate these incentives, including disjointed regulatory approaches or frameworks that create legal boundaries and compliance barriers, especially when undertaking cross-border business (Ullah & Al-Turjman, 2023). Technological issues, such as underdeveloped protocols and weaknesses in smart contracts, also present issues with transaction security, automation errors and opportunities for exploitation by bad actors (Zhitomirskiy et al., 2023). There is also a barrier with organizational inertia, as traditional real estate stakeholders, such as regulators and institutional investors, are still reluctant to move from legacy systems to decentralized models due to their concerns over risk exposure, accountability and stability (Margret & Julie, 2024). Further, the issue of liquidity paradoxes, where tokenization is meant to improve liquidity but, given speculative trading and limited adoption in developing economies, may cause market instability (Choi et al., 2024). These drivers and barriers coexist, highlighting the need for strategic initiatives, such as harmonizing regulations, improving investor education, and developing technologies that address market scalability and security issues.

[3] https://cryptoslate.com/st-regis-aspen-resort-raises-18-million-via-security-token-offering/

[4] https://tokenist.com/propellr-and-fluiditys-nyc-real-estate-tokenization-deal-falls-through/

Table 3. Drivers of real estate tokenization

Main theme (TOE)	Sub-theme (Drivers)	Description	References
Technological	Decentralized system	Blockchain enables distributed governance and peer-to-peer transactions by eliminating centralized intermediaries	(Kreppmeier et al., 2023; Choi et al., 2024; Margret & Julie, 2024)
	Transparency	Open access to transaction records is ensured via public ledgers which reduce information asymmetry	(Sternik & Safronova, 2021; Ullah & Al-Turjman, 2023; Zhitomirskiy et al., 2023)
	Data immutability	Trust in ownership and the legitimacy of transactions is increased by tamper-proof records	(Treleaven et al., 2021; Saari et al., 2022; Avci & Erzurumlu, 2023)
	Reliability and security	Cybersecurity measures guard against fraud and illegal access	(Sunyaev et al., 2021; Wong et al., 2024; Zook & McCanless, 2025)
	Accountability	Enabling auditable records of asset ownership and transfers	(Arcenegui et al., 2023; Crandall, 2023; Steininger, 2023)
	Smart contracts automation	Self-executing contracts streamline payment, transaction, and compliance procedures	(Mottaghi et al., 2024; Maioli & Livingstone, 2025; Tanveer et al., 2025)
Organizational	Operational efficiency	Decreased administrative workloads as a result of digital records and automated processes	(Chow & Tan, 2021; Zhang et al., 2024a; Liu & Chen, 2025)
	Cost minimization	Reduced transaction costs by reducing the number of intermediaries (brokers, custodians, etc.)	(Dutta, 2020; Garcia-Teruel & Simón-Moreno, 2021; Yusof et al., 2023)
	Improved liquidity	Token trading on the secondary market enhances asset liquidity in contrast to conventional real estate	(Rogers & Dutta, 2020; Abualhamayl et al., 2024; Spiga et al., 2024)
	Fraud prevention	Property fraud risks are decreased by immutable records and verification procedures	(Simons & Simons, 2022; Aharon et al., 2024; Yousaf et al., 2024)
	Investor trust	Trust in tokenized assets is increased by transparent procedures and automated compliance	(Abdullah et al., 2023; Nagl et al., 2024; Kumar et al., 2025)
Environmental	Market demand for liquidity	Increasing inclination among investors for fractionalized, liquid real estate assets	(Kreppmeier et al., 2023; Swinkels, 2023; Choi et al., 2024)
	Regulatory developments	Emerging regulatory frameworks acknowledging tokens as securities, allowing compliant issuance	(Steininger, 2023; Zhu et al., 2024; Maioli & Livingstone, 2025)
	Institutional adoption	Growing involvement from proptech platforms and institutional investors	(Arcenegui et al., 2023; Crandall, 2023; Zook & McCanless, 2025)
	Cross border investment	Blockchain removes jurisdiction hurdles to enable smooth international transactions	(Sunyaev et al., 2021; Saari et al., 2022; Wong et al., 2024)
	Sustainability trends	Tokenization supports environmental, social, and governance (ESG) objectives through the facilitation of transparent effect tracking and green financing	(Sternik & Safronova, 2021; Treleaven et al., 2021; Avci & Erzurumlu, 2023)

Table 4. Barriers to real estate tokenization

Main theme (TOE)	Sub-theme (Barrier)	Description	References
Technological	Integration complexity	Challenges with integrating blockchain technology with traditional real estate platforms and appraisal techniques	(Ullah & Al-Turjman, 2023; Zhitomirskiy et al., 2023; Margret & Julie, 2024)
	Scalability limitations	Large-scale real estate transactions are hampered by throughput limitations of blockchain networks	(Kreppmeier et al., 2023; Swinkels, 2023; Choi et al., 2024)
	Security vulnerabilities	Cybersecurity risks, defects in smart contracts, and custody problems in the management of digital assets	(Abdullah et al., 2023; Nagl et al., 2024; Kumar et al., 2025)
	Lack of interoperability	Blockchain systems' incompatibility with conventional property registers or trading platforms	(Simons & Simons, 2022; Aharon et al., 2024; Yousaf et al., 2024)
Organizational	Insufficient Expertise	Inadequate technical expertise among interested parties to administer or deploy tokenized systems	(Rogers & Dutta, 2020; Spiga et al., 2024; Abualhamayl et al., 2024)
	Change resistance	Institutional rigidity and a preference for conventional off-market transactions over blockchain-based schemes	(Dutta, 2020; Garcia-Teruel & Simón-Moreno, 2021; Yusof et al., 2023)

End of Table 4

Main theme (TOE)	Sub-theme (Barrier)	Description	References
	High implementation costs	Costs associated with SPV setups, legal compliance, and blockchain infrastructure.	(Chow & Tan, 2021; Zhang et al., 2024b; Liu & Chen, 2025)
	Insufficient internal infrastructure	Insufficient organizational preparedness to implement hybrid tokenization models or decentralized systems	(Mottaghi et al., 2024; Maioli & Livingstone, 2025; Tanveer et al., 2025)
Environmental	Regulatory uncertainty	Uncertain legal frameworks pertaining to fractional ownership, cross-border compliance, and token classification	(Kreppmeier et al., 2023; Choi et al., 2024; Margret & Julie, 2024)
	Cryptocurrency volatility	Token values and investor trust are undermined by price volatility in cryptocurrency exchanges	(Sternik & Safronova, 2021; Ullah & Al-Turjman, 2023; Zhitomirskiy et al., 2023)
	Limited market liquidity	Sporadic trade volumes and fragmented secondary markets for tokens with a single asset	(Treleaven et al., 2021; Saari et al., 2022; Avci & Erzurumlu, 2023)
	Physical asset constraints	Complete real estate digitization is constrained by the requirement for localized appraisals and physical inspections	(Sunyaev et al., 2021; Wong et al., 2024; Zook & McCanless, 2025)
	Adverse selection	Speculative investors are drawn to tokenized markets, decreasing long-term participation and confidence	(Arcenegui et al., 2023; Crandall, 2023; Steininger, 2023)

5. Discussion

This study reveals that RET is a revolutionary but yet nascent technology that has great potential and inherent challenges. Although conventional inefficiencies such as opacity, illiquidity and high entry hurdles are addressed by blockchain-enabled tokenization, technological constraints, unclear regulations, and an immature market continue to impede its practical application. The findings highlight the dual nature of RET's potential – systemic and operational flaws restrict its practical scaling, despite its conceptual strength being robust.

The key uses of tokenization, including DeFi integration, smart contract automation, and fractional ownership demonstrate its ability to simplify transactions and democratize real estate access. Studies such as Aspen Coin show the potential for fractionalization of high-value assets (Mottaghi et al., 2024). Regarding cross-border transactions, smart contract agility can provide efficiencies by reducing the need for intermediaries and avoiding fraud (Timuçin & Biroğul, 2023). However, much of the research on tokenization ignores how it would integrate into real-world scenarios e.g. IPSX demonstrate that regulatory and technological readiness is not currently possible. This disparity raises concerns around the tension between theoretical value and practical implementation (Simons & Simons, 2022; Nagl et al., 2024). The drivers and barriers identified through endogenous and exogenous influences through the TOE model reflect those challenges for implementation. For example, while organizational drivers like operational efficiency suggest increased interest in digital innovation in real estate (Aharon et al., 2024; Spiga et al., 2024), technological enablers like transparency and decentralization foster trust (Yousaf et al., 2024). Environmental drivers of this nature include the growing demand for liquidity and investment, as well as regulatory change (Abualhamayl et al., 2024). The continuing barriers of internal opposition, cryptocurrency volatility and regulatory ambiguity make progress in RET difficult (Garcia-Teruel & Simón-Moreno, 2021); the physicality of real estate is also a limitation on the full potential of digital transformation, especially in the context of inspection and valuation (Yusof et al., 2023).

Failed initiatives such as Fluidity-Propellr are testament to the speculative and uncertain nature of RET platforms, showing that early commercialization and immature technology have resulted in some unsatisfactory experiences (Crandall, 2023). Further, tokenized assets are frequently difficult for individual investors to assess, leading to problems with liquidity and cost discrepancies (Liu & Chen, 2025). These systemic weaknesses highlight the need for market education and regulatory uniformity in addition to technology advancement for long-term adoption (Chow & Tan, 2021). Geographic disparities are also noticeable. When governance is inadequate in emerging markets like Nigeria, RET provides benefits for transparency and anti-fraud measures (Adaramola, 2025). However, adoption is slowed by institutional opposition and poor public awareness. On the other hand, established legacy systems and strict regulations are challenges for mature markets (Zhang et al., 2024b). Regardless of the background, the development of RET points to a rising movement in academia and industry toward a digital paradigm change. Likewise, new RET interfaces with AI and IoT offer encouraging paths for sustainability and asset management (Huh & Kim, 2020). However, fundamental problems, including backward compatibility and digital identity verification, need to be resolved (Tanveer et al., 2025). Targeted empirical research in fields such as multi-asset token portfolios and hybrid governance models will be necessary to bridge theory and

practice. RET is ultimately at a turning point in its long trajectory; achieving its full potential will require cooperation from industry stakeholders, regulators, and technologists to navigate its intricate and changing terrain.

5.1. Implications

5.1.1. Practical implications

The findings of the research offer helpful knowledge about how tokenization might be used in the real estate industry. Firstly, by permitting fractional ownership, RET improves market accessibility and reduces entry barriers for individual investors (Yusof et al., 2023). Financial inclusion will be significantly impacted by this democratization of real estate investing, especially in developing nations where access to expensive real estate is still restricted (Chow & Tan, 2021). Secondly, tokenization enhances liquidity in real estate markets by allowing digital assets to be exchanged in real estate markets (Mottaghi et al., 2024). The trading process can happen almost in real-time, lowering liquidity thresholds, while at the same time providing greater flexibility of portfolio choice compared to traditional real estate investments which are associated with high transaction fees and long timescales (Maioli & Livingstone, 2025). Thirdly, using smart contracts based on blockchain technology embedded in tokenized transactions can add efficiency to transactions by automating key tasks, such as the distribution of rent, verification of ownership, and ownership transfer (Arcenegui et al., 2023). Through the use of decentralized and immutable records, automation can reduce the administrative burden, lessening reliance on intermediaries while providing a lower risk of fraud (Ali et al., 2025). Finally, this research highlights some of the key shortfalls of RET, including market volatility, cybersecurity risk, and legal compliance. The research identifies these issues and provides useful recommendations for market players on designing risk-reduction strategies, such as improved due diligence practices and frameworks for legal compliance.

5.1.2. Managerial implications

This research provides strategic guidance on implementing tokenization into existing business models for players such as legislators, banks, and real estate developers. Firstly, asset managers and real estate developers may utilize tokenization to attract more investors, while tokenization provides investors with fractional ownership which cultivates interest from institutional and retail investors alike (Steininger, 2023). Since tokenized assets are fractionalized, businesses must adapt new valuation methods to reflect this change. Secondly, real estate tokens can be used by financial institutions and investment platforms to create cutting-edge financial products such as tokenized real estate funds or hybrid investment portfolios that blend digital and traditional asset classes (Manahov & Li, 2025). This diversification approach solves liquidity issues in real estate finance while improving investment options. Thirdly, these insights can be utilized by policymakers and regulatory bodies to develop strong legislative frameworks that promote expansion of tokenized real estate markets while guaranteeing investor protection and adherence to know-your-customer (KYC) and anti-money laundering (AML) regulations (Thommandru & Chakka, 2023). To promote confidence and stability in the industry, it is essential to establish standardized procedures for smart contract governance, asset verification, and secondary market regulations (Zook & McCanless, 2025). Finally, to protect digital assets from theft and hacking, real estate companies need to invest in cybersecurity and blockchain infrastructure (Saari et al., 2022). As such, the long-term viability of RET depends on the application of best practices in data protection, investor education, and compliance monitoring.

5.1.3. Policy and regulatory implications

The lightning-fast development of RET calls for a proactive and clear policy framework to guarantee that its revolutionary potential is efficiently utilized while reducing related risks. To provide legal certainty and investor safety, policymakers have to establish precise regulatory standards that control trading, issuance, and taxation of real estate tokens (Wong et al., 2024). Through cooperation with financial regulators, legal experts, and industry stakeholders, governments can develop flexible policies that strike a balance between market stability and innovation. Investor trust in tokenized real estate markets is still based on transparency; thus, regulators have to set strict guidelines for information regarding asset values, related risks, and transaction processes (Margret & Julie, 2024). Third-party verifications and independent audits can increase market credibility by guaranteeing that tokenized real estate offerings follow accepted legal and financial standards (Choi et al., 2024). Moreover, policymakers need to encourage financial inclusion by facilitating the establishment of user-friendly tokenization platforms that serve a wide range of investors along with providing regulatory certainty (Nagl et al., 2024). Ensuring accessibility through streamlined onboarding procedures and investor education programs would enable people to more effectively engage in RET markets. Fostering well-informed investment decisions requires the provision of educational materials that emphasize the benefits as well as limitations of RET. Likewise, improving liquidity and price discovery for real estate tokens requires the establishment of regulated secondary markets (Abdullah et al., 2023). Governments should support the growth of these trading platforms while putting protections in place against systemic risks and market manipulation. If this comes to fruition, cooperation between fintech companies and traditional financial institutions will facilitate integration of tokenized assets into the existing market, increasing its stability and efficiency.

While the use of smart contracts in tokenized real estate transactions has numerous benefits in terms of automation and efficiency (Timuçin & Biroğul, 2023), the development of standard templates and regulations to promote interoperability and reduce transaction costs is needed to ensure the legality and enforceability of these contracts

(Ullah & Al-Turjman, 2023). Governments could help spread this revolutionary technology that could simplify real estate transactions and decrease conflicts by introducing a legal framework to enable smart contracts. Sustained growth of RET involves more than just regulation and technology infusion. Although these are critical, progress must continue to be monitored. To support sustained growth of the RET sector and innovations in regulatory processes and technology, governments should support regulatory sandboxes and innovation hubs for industry participants to test out tokenization technologies. Financial support will further support innovation and market development by exploring new RET applications through research and pilot projects.

5.2. Future research directions

The quickly evolving world of RET offers many opportunities for future research, particularly as technology evolves and laws are finalized. The legal and regulatory aspects of RET, in particular the ways in which different jurisdictions adapt their general financial and property laws to accommodate tokenized assets, represent some of the more pressing areas for further studies. Comparative research assessing the effectiveness of various regulatory approaches can provide useful insights into how regulatory interests can best be balanced with market resiliency, investor protection, and innovation. Studies on the contribution of global regulatory harmonization to cross-border tokenized real estate transactions are crucial to understanding how to promote global market integration while reducing legal ambiguities. Future research must also direct attention to assessing the financial implications of RET, particularly surrounding risk management, valuation techniques, and liquidity. While tokenization is expected to enhance liquidity through secondary market trading and facilitate fractional ownership, quantitative studies must be conducted to better understand the actual impacts on price discovery, volatility, and overall market efficiency. Research should examine the valuation techniques used in tokenized real estate transactions in order to understand where tokenized assets fit against traditional real estate investments with respect to transparency and accuracy of pricing. Due to factors that pose risks, such as vulnerabilities of smart contracts, cybersecurity threats and structural financial risks of tokenized property markets, RET specific-risk evaluation models should also be developed.

Additional studies must be conducted to grasp the technological dimensions of RET fully, particularly as they pertain to the integration of decentralized financing (DeFi) solutions, smart contracts, and blockchain into real estate ecosystems. Beyond the interoperability of asset tokenization platforms, research may assess the scalability and security of blockchain networks in RET. Research on how machine learning and AI will be used to automate fraud

Table 5. Real estate tokenization: An agenda for future research

Category wise gaps	Open research questions (ORQs)
Fractional ownership	How does fractional ownership-based tokenization affect conventional real estate investing models? How does fractional ownership affect regulations across different jurisdictions? How may fractional ownership enhance the accessibility and affordability of real estate? What potential risks and conflicts may arise from several token holders possessing a single piece of real estate? What effects does fractional ownership have on decision-making and asset governance procedures?
Customization	In what ways may smart contracts facilitate more adaptable RET investment options? How much adaptability are investors looking for in tokenized real estate products? How are customized investment portfolios feasible with tokenized real estate platforms? What technological constraints exist in putting configurable real estate token features into practice? How does investor risk perception in tokenized real estate markets change as a result of customization?
Crowdfunding	How does tokenization for real estate differ from conventional types of crowdfunding? What regulatory protections are required for tokenized real estate crowdfunding investors? In what ways might blockchain technology improve participation and confidence in real estate crowdfunding? In what ways can tokenization democratize access to substantial real estate investment opportunities?
Disintermediation	In what ways can tokenization reduce the need for intermediaries in real estate transactions? How does eliminating intermediaries from real estate transactions affect legal requirements and regulations? What effect does disintermediation have on real estate investment cost structure? What challenges do investors face when using tokenized real estate transactions in the absence of conventional middlemen? How can brokers and real estate agents be replaced by smart contracts in tokenized markets?
Flexibility	How does RET, as opposed to conventional real estate assets, improve investment flexibility? How may tokenized real estate holdings become easily transferable or modified by investors? What effect do legal restrictions have on the adaptability of tokenized real estate investments? What aspects of flexible tokenized real estate investment alternatives affect investor preferences? How may fractional ownership arrangements be modified to meet the evolving demands of investors?

End of Table 5

Category wise gaps	Open research questions (ORQs)
Operational efficiency	In what ways does blockchain technology improve real estate transactions' operational efficiency? What financial benefits come with using smart contracts to automate real estate procedures? In what ways might tokenization simplify property administration and reduce administrative varieties? What barriers stand in the way of tokenized real estate markets reaching complete operational efficiency? What effects does tokenization have on the compliance and due diligence procedures in real estate deals?
Settlement time	In what ways does blockchain technology speed up real estate transaction settlement times? What challenges arise when tokenized real estate assets are settled in real time? What is the effect of distinct blockchain designs on the speed of real estate transactions? What impact does a reduced settlement time have on tokenized real estate assets' liquidity? What risks arise from real estate transactions that are settled instantly?
Transparency	How might blockchain increase real estate transaction transparency? How do smart contracts contribute to tokenized real estate transparency? What effects does transparency have on investor confidence and trust in tokenized real estate? What challenges arise from guaranteeing complete transparency in tokenized real estate while preserving data privacy?
Liquidity	How much does tokenization improve historically illiquid real estate assets' liquidity? What are the primary challenges preventing tokenized real estate markets from attaining liquidity? What impact do secondary markets have on real estate token liquidity? How does price stability in tokenized real estate marketplaces depend on liquidity? What effects do network congestion and transaction fees have on liquidity in blockchain-based real estate markets?
Access to broader investor base	In what ways can tokenization make it easier for individual investors to enter the real estate market? What are the main behavioral and social characteristics of tokenized real estate investors? How does RET affect foreign investment in regional real estate markets? How can educational programs contribute to the growing number of retail investors using tokenized real estate? How can legislators guarantee fair access to opportunities for investing in tokenized real estate?

detection, transaction speed, and real estate token pricing will provide considerable insight into the forthcoming wave of digital real estate ecosystems. Multidisciplinary research combining computer science, financial technology, and real estate economics will be of great importance to track the trajectory of tokenization as it continues to emerge. Additionally, the socio-economic implications of RET remain an under-researched topic. Research examining how tokenization could impact housing affordability, wealth distribution, and financial inclusion may assist authorities in establishing regulations that maximize the constructive social impacts of the technology. Research on market dynamics should also examine investor behaviour in tokenized real estate markets, particularly around the variables impacting risk acceptance and adoption. Finally, research into how real estate transactions completed using blockchain technology link with environmental impact may inform how RET aligns with international sustainability initiatives and broader objectives of green finance. Table 5 outlines a research agenda based on the identification of several key open research questions (ORQs) in the field at the nexus of tokenization and real estate. Ultimately, future studies should utilize an integrated approach that incorporates socio-economic, regulatory, financial, and technological perspectives to develop a thorough knowledge of RET. As the topic evolves further, scholarly research will be essential to resolving outstanding issues and realizing RET's full potential as a game-changing element in the global real estate market.

5.3. Limitations

This study has certain limitations that may help guide further studies. Firstly, although replicability is guaranteed by our methodical search strategy, the emphasis on journal articles in WoS/Scopus may exclude pertinent conference papers or grey literature. The scope of databases coverage may be extended in future reviews (e.g. IEEE Xplore and Science Direct). Secondly, following PRISMA guidelines, future reviews could include quality scoring while preserving our methodical search process. Thirdly, the intricacy of RET requires multiple complementary reviews and meta-analyses to fully map its aspects. Finally, although highlighting significant research gaps and potential future directions, the study does not provide empirical evidence for the viability of proposed solutions.

6. Conclusions

Real estate tokenization is outlined as a paradigm-shifting breakthrough in this systematic review of 75 research papers which synthesizes information from three perspectives – applications, technological-organizational-environmental (TOE) drivers/barriers, and proposed solutions. Findings highlight how tokenization may address systemic inefficiencies in traditional markets and democratize real estate investing through fractional ownership, improved liquidity, and cross-border accessibility. Key drivers are identified by the TOE framework as follows: (1) technological developments in blockchain infrastructure (interopera-

bility, scalability, cybersecurity); (2) organizational changes toward the adoption of digital assets and portfolio diversification; and (3) environmental catalysts, such as changing institutional validation and regulatory frameworks in leading jurisdictions. On the other hand, barriers persist; these include organizational opposition to changes to legacy systems, technological vulnerabilities (such as smart contract risks), and regulatory fragmentation.

Stakeholders are faced with strategic requirements. Firstly, regulatory harmonization should be a top priority for legislators to facilitate compliance clarity and cross-jurisdictional interoperability. Secondly, with the goal to reduce volatility in emerging markets, investors need to strike a balance between the benefits of liquidity and thorough due diligence. Thirdly, to bridge conventional and decentralized ecosystems, industry leaders need to implement focused initiatives for workforce upskilling, stakeholder education, and technology integration. Long-term socio-economic effects, especially on housing affordability and market stability as well as ethical considerations such as data governance and equal access, should be the main focus of future research. Scalable frameworks could be informed by comparative studies of regulatory models, and innovative applications could be stimulated by multidisciplinary research on convergence with AI and IoT technology. Together, these insights provide a road map for utilizing tokenization's revolutionary potential while overcoming its numerous barriers.

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