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Unlocking the Potential of Security Token Offerings:

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ABSTRACT

Security token offerings (STOs) are transforming financial markets by providing a regulated alternative to speculative initial coin offerings (ICOs) and bridging traditional finance with blockchain technology. Despite their potential, the STO industry faces challenges in fostering a sustainable ecosystem. This study explores critical factors and interactions within the STO industry by incorporating perspectives from platform operators, custodial institutions, regulatory authorities, and investors. Through in-depth interviews with 15 stakeholders and a causal loop diagram analysis, the authors identify key issues, including the need for competitive STO products, an active distribution market, balanced innovation and investor protection, and risk mitigation for unregulated sales. Based on these findings, they propose targeted strategies to address these challenges, offering practical and theoretical insights into the STO ecosystem and its sustainable growth.

Previous Next

Keywords

Blockchain Technology; Causal Loop Diagram; Financial Market Regulation; In-Depth Interview; Market Activation Strategies; Security Token Offerings; Sustainable Ecosystem Development

INTRODUCTION

Initial coin offerings' (ICOs) success demonstrates security token offerings' (STOs) potential. ICOs revolutionized startup funding by leveraging blockchain technology to reach a global investor base. For instance, EOS, a blockchain platform designed for decentralized applications, raised 4.2 billion United States dollars (USD) through an ICO in 2018, while Ethereum raised 18.4 million USD in 2014 through an ICO and has since become the second largest cryptocurrency in the world, with a market cap exceeding 200 billion USD (Dean, 2023; Market Reports World, 2023). The ICO market's growth and success underscore the potential of STOs. The global ICO service market experienced significant growth in 2023, with the number of projects raising funds and the amount of capital raised steadily increasing. Factors contributing to the growth of the ICO market include advances in blockchain technology, increased interest in digital assets, and ICOs' appeal as an alternative to traditional funding methods (Market Reports World, 2023). These successful examples of ICOs and their market size demonstrate the direction and potential for STOs moving forward.

STOs overcome ICO regulatory limitations, creating safer investment environments attractive to institutional and retail investors. The STO market has proliferated in recent years. STOs raised 442 million USD (28 offerings, 2018), 452 million USD (55 offerings, 2019), and 4.1 billion USD (380 offerings, 2020). The STO market is expected to grow at a compound annual growth rate of 59%, continuing significant growth through 2030, driven by regulatory developments, expanding the service provider ecosystem, and changing investor perceptions of digital assets (Liechtenstein Cryptoassets Exchange, 2020).

South Korea played a prominent role during the ICO boom, primarily due to the "Kimchi Premium" phenomenon, where cryptocurrency prices in South Korea exceeded global market prices because of strong domestic demand and regulatory factors, as

well as significant trading volumes on local cryptocurrency exchanges (Davier, 2024; Salvo, 2024). This active participation in the digital asset market positions South Korea as a critical case study for researching STOs. The country's regulatory environment, advanced technological infrastructure, and enthusiastic investor base create an ideal foundation for STO growth. Furthermore, South Korea's leadership in platform-based digital services extends beyond cryptocurrencies into government initiatives. For instance, Nam et al. (2024) highlight the success of Korea's e-government platform, Government 24, which enhances efficiency, improves service quality, and boosts user satisfaction. These insights are directly applicable to the digital asset industry, where platform efficiency, reliability, and user trust are equally essential for sustainable engagement and growth.

High trading volumes on platforms such as Upbit and Bithumb underscore South Korea's vibrant cryptocurrency market. Notably, the daily trading volume on Korean cryptocurrency exchanges has recently surpassed that of the Korea Composite Stock Price Index, demonstrating the nation's strong interest in digital assets. For instance, on a specific trading day, the total volume across major Korean cryptocurrency exchanges reached approximately 12 trillion Korean won (KRW), exceeding the Korea Composite Stock Price Index's 11.47 trillion KRW (Malwa, 2024; Park, 2021; Wright, 2021). Similar to the government's successful integration of digital services for public use, South Korea's digital asset ecosystem thrives on platform innovation and active user participation. Unlike markets dominated by institutional investors, the growth of Korea's digital asset industry is largely driven by retail users. This retail-driven dynamic provides valuable insights for other countries, illustrating how platform-oriented strategies can enhance both adoption and market vibrancy.

However, a noticeable gap exists in literature specifically addressing the STO industry. Most existing research has conducted conceptual analyses or comparisons with ICOs without addressing significant issues. For example, Mendelson (2019) discussed the regulatory aspects of ICOs from a securities law perspective, offering a legal framework and analysis method based on the U.S. Securities and Exchange Commission's (SEC) aggressive case-by-case approach in the decentralized autonomous organization (DAO) report. Guseva (2020) presented the applicability of security laws, providing a valuable framework for courts, regulators, and market participants. Studies in the United States and Europe present an overview of the market, explaining why STOs, though still in their infancy, could become an essential part of entrepreneurial finance (Lambert et al., 2022). Other studies focused on security tokens and STO models for corporate financing, analyzing security tokens from the perspective of companies seeking capital (Ante & Fiedler, 2020); however, in-depth studies focusing on specific issues in the STO industry remain scarce.

The development of the STO industry is crucial for several reasons. STOs provide a regulated framework that enhances investor protection, making them appealing to institutional investors. Tokening traditional assets increases market liquidity and accessibility, allowing a broader range of investors to participate. Adopting STOs can foster innovation in financial products and services, creating new investment opportunities; however, the biggest problem in the STO industry today is that it has yet to reach the expected scale due to regulatory issues and a more complex funding environment than ICOs. Despite this, most existing research does not address these significant issues but instead focuses on the general context of the industry. Given that the STO industry involves a variety of stakeholders, it is vital to identify the challenges faced by each stakeholder and propose solutions to address them.

This study explores STO business challenges and proposes activation recommendations through comprehensive stakeholder analysis to identify key growth factors. The dynamic participation of South Korea in the digital asset market is a noteworthy case, and activation strategies in Korea can provide insights for other countries. For South Korea to maintain its leading position in the digital asset space, it must embrace and foster growth in emerging areas like STOs. Thus, this study aims to identify the unique challenges and opportunities for STOs in the Korean market and develop strategic recommendations to promote the growth and success of the STO industry.

To achieve this, we adopted an interview-based exploratory approach, engaging 35 experts and investors carefully selected from companies participating in South Korea's Innovative Financial Services framework—commonly known as the Korean Innovative Finance System. This system, established under the Financial Services Commission's regulatory sandbox initiative in 2019, allows qualified firms to test innovative financial products and services in a controlled environment, thereby facilitating financial technology advancement and encouraging institutional experimentation (Financial Services Commission, 2019a). The inclusion of participants from this system ensures that our interviewees possess both regulatory insight and frontline experience with STO-related innovations.

Our analysis is grounded in the perspectives of four key stakeholder groups: platform operators, custodial institutions, regulatory authorities, and investors. These categories represent the core participants in the STO ecosystem and provide a comprehensive lens through which to understand the multifaceted challenges and dynamics shaping the industry. Based on data collected through these interviews, we conducted a causal loop diagram (CLD) analysis to uncover the systemic interactions among these stakeholders and formulated propositions to address the major issues identified. This study offers both theoretical and practical implications by providing a structured and stakeholder-informed view of the STO ecosystem.

CONCEPTUAL BACKGROUND

STO Concept and Industry Status

The success of Bitcoin highlighted the emergence of blockchain technology, which has led to a range of applications that go far beyond its initial scope, such as electronic money or a supply of value. Tokenization, implemented through smart contracts (self-executing contracts with the terms of the agreement directly written into lines of code) and distributed ledger technology (DLT; a type of database shared, replicated, and synchronized among members of a network), enables the creation and exchange of digital assets as tokens. This process is one of the significant use cases of blockchain; it converts various rights and assets into digital tokens, enhancing the security and transparency of transactions (Ante & Fiedler, 2020; Benedetti & Rodriguez-Garnica, 2023; Nan & Kaizoji, 2019).

These blockchain technologies enabled global crowdfunding growth in the 2010s, allowing online capital raising (Mollick, 2014; Vulkan et al., 2016). Subsequently, in 2017 and 2018, numerous projects raised significant funds through ICOs (Fisch, 2019; Howell et al., 2020); however, after the ICO bubble burst in 2018 due to a lack of funding, utility, or legitimacy, STOs emerged, offering investments in securities recorded on a blockchain. These securities are typically sold to accredited or experienced investors; therefore, STOs are more similar to private placements than public offerings (Janney & Folta, 2006; Wruck & Wu, 2009).

According to the Swiss Financial Market Supervisory Authority guidelines, tokens can be classified as payment, utility, or security (asset) tokens. Payment tokens, including Bitcoin or Ethereum, are primarily used for payment. Utility tokens, such as Basic Attention Tokens, provide consumption rights within a specific platform, and security tokens represent regulated investment products like stocks or real estate, offering a modern alternative to traditional securities (Swiss Financial Market Supervisory Authority, 2018). Security tokens, such as Harbor, are subject to the same regulatory requirements as traditional securities; thus, they can be considered follow-up products to compliant utility tokens (Kreppmeier et al., 2023). Security tokens offer advantages over traditional securities: immediate 24/7 transferability, minute-level clearing and settlement, private custody without brokers, and blockchain-ensured transparency (Ante & Fiedler, 2020).

The key stakeholders in the security token industry include issuers, investors, platform providers, and regulators. Issuers raise capital through STOs, and investors benefit from increased liquidity and transparency of digital assets. Platform providers facilitate transactions and provide technological infrastructure, while regulators ensure investor protection and market health through regulatory frameworks. The interactions among these stakeholders are crucial for the successful adoption of STOs.

STOs continue to evolve under rapidly developing regulatory frameworks. In the United States, the SEC plays a central role in determining the legal status of digital assets. The SEC has maintained that most STOs fall under the definition of securities and are subject to existing federal securities laws, often applying the Howey Test to determine whether a digital asset is a security. Since the DAO Report in 2017, the SEC has pursued enforcement actions against STOs that failed to register or qualify for an exemption, emphasizing investor protection and market transparency (Securities Exchange Commission, 2017). The SEC's strategy involves strict enforcement and guidance through litigation, creating legal precedent on a case-by-case basis. Additionally, the launch of the Strategic Hub for Innovation and Financial Technology reflects the SEC's effort to provide clearer guidance on compliant token issuance and trading.

In Europe, the Markets in Crypto-Assets Regulation (MiCA) was officially adopted in 2023 by the European Union as a comprehensive regulatory framework for digital assets, including security tokens. MiCA distinguishes between different types of tokens, with asset-referenced and e-money tokens requiring authorization and regulatory supervision. While MiCA focuses primarily on non-security tokens (which are not governed by the Markets in Financial Instruments Directive II), security tokens still fall under the existing EU securities laws, such as Markets in Financial Instruments Directive II and the Prospectus Regulation. However, regulatory sandboxes and pilot regimes, like the EU's DLT Pilot Regime implemented in March 2023, allow market infrastructures to experiment with trading and settlement of tokenized securities under a controlled environment. These developments signify a coordinated effort to encourage innovation while safeguarding investors and ensuring financial stability (European Union, 2023).

The global market for security tokens and tokenized assets is demonstrating significant growth potential, although estimates of its current size and future trajectory vary (Banerjee et al., 2024; Cunningham et al., 2024). The broader tokenization market, encompassing various digital assets, was valued at approximately USD 3.32 billion in 2024 and projected to reach USD 12.83 billion by 2032 (Fortune Business Insights, 2025). Focusing specifically on tokenized real-world assets (RWAs), excluding stablecoins, this segment reached approximately USD 15.2 billion by the end of 2024, showing substantial year-over-year growth (Tran, 2024). Future projections suggest a considerable expansion by 2030. Notably, Boyle (2023) anticipates that the value of tokenized financial and RWAs could approach USD 4 trillion by 2030, driven largely by growth in private markets. This represents a significant potential increase, highlighting tokenization as a key use case for blockchain technology. This growth is spurred by the increasing demand for asset tokenization, which offers benefits like fractional ownership, enhanced liquidity for traditionally illiquid assets, and improved transaction efficiency through blockchain. While regulatory developments and institutional adoption are key enablers, the potential for STOs to transform capital markets is widely recognized (Park et al., 2024). In specific regions, such as Japan, the public STO market saw issuances totaling JPY 46.4 billion (approx. USD 300 million) in fiscal year 2024, contributing to a cumulative total of JPY 168.2 billion (approx. USD 1.1 billion) (Sudo, 2024).

Despite the promising growth trajectory of the STO market, several challenges continue to hinder broader investor participation and market development. One of the primary concerns is risk perception and regulatory uncertainty. Many investors remain hesitant to engage with STOs due to their association with the highly volatile cryptocurrency market. This skepticism is further exacerbated by the absence of consistent global regulatory standards, which creates confusion and hesitation among potential participants (Dharmadhikari, 2025). In South Korea, for instance, STO regulations are still evolving, contributing to investor wariness, with legislative progress stalling despite initial guidelines being released (Jun, 2024; Niño, 2024; Yoon & Lee, 2024).

Another significant barrier is the lack of product diversity. At present, most STO offerings are concentrated in the real estate sector, limiting the scope of investment opportunities. To attract a broader base of institutional investors, it is essential to expand the range of tokenized assets to include financial instruments, intellectual property, and venture capital.

Furthermore, the absence of a robust secondary market presents a considerable challenge. Unlike traditional equities, security tokens generally lack liquid trading platforms, which undermines investor confidence. The development of regulated digital securities exchanges is crucial for enabling efficient trading, price discovery, and overall market growth. The success of STOs will largely depend on how effectively these structural and regulatory gaps are addressed.

As such, STOs are developing by considering various stakeholders and regulatory requirements and have significant growth potential in the global and Korean markets. Based on this background, successfully adopting and activating STOs requires a detailed understanding of each stakeholder's challenges and the specific approaches to solving them. This study comprehensively analyzes the industry status of STOs from the perspectives of various stakeholders and proposes strategic measures for activating STOs in the South Korean market.

The STO Business in Korea

The STO business in Korea has evolved into fractional investment forms by diversifying underlying assets, which differs significantly from the STO businesses in the United States and Singapore. Various technological and social factors have driven the emergence of STOs in Korea. Technologically, digitizing assets based on DLT has diversified the range of investment opportunities, from real estate profit securities to assets such as artwork, music copyrights, and Korean content—cultural products from South Korea. A key category emerging under Korean guidelines is investment contract securities, which typically refer to rights to a share of profits or returns from a specific underlying project or asset, often distinct from traditional equity or debt, and are regulated as securities. The world-class mobile infrastructure has enabled investors to access the digital platforms of these investment products. Socially, there is low resistance to new investment methods, a preference for high-risk, high-return investments, and the emergence of the MZ generation (a combination of Millennials and Generation Z), which is highly active in value consumption. These factors have supported the development of legal and institutional frameworks; for example, a regulatory framework for issuing and distributing tokenized securities was established in February 2023. Regulatory authorities have announced that STOs will be permitted under the Capital Market Act. The key elements of the guidelines include principles for determining whether a digital asset constitutes security and measures to improve the regulatory system for issuing and distributing tokenized securities. Figure 1 presents the structure of the STO ecosystem based on these guidelines.

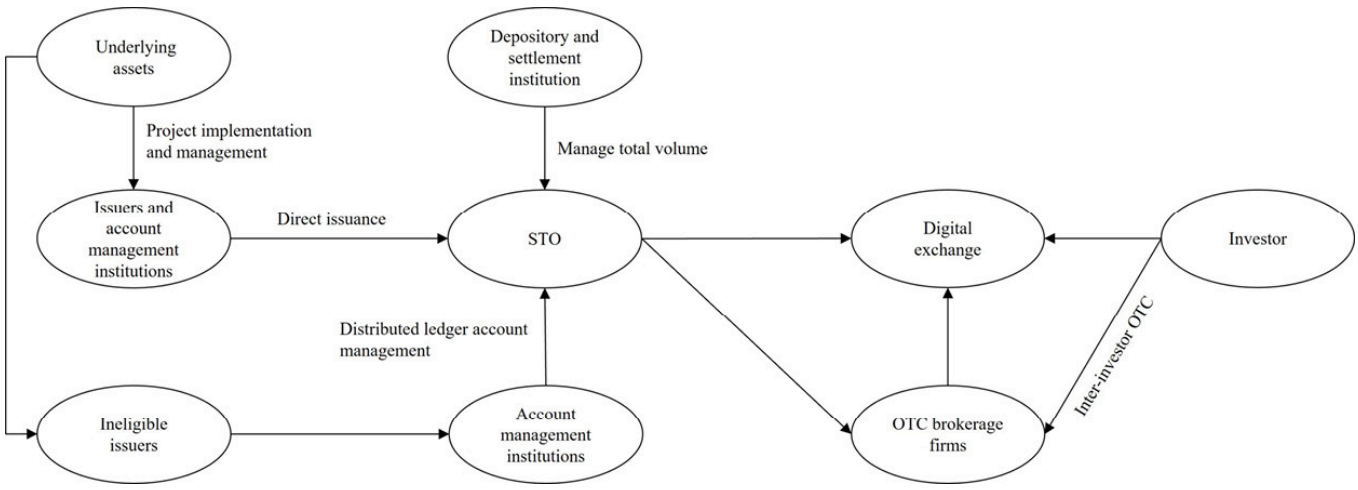

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Figure 1. Structure of the Security Token Offering Ecosystem

Note. STO = security token offerings; OTC = over-the-counter.

Issuers locate physical assets to tokenize, evaluate the asset's value, and directly participate in issuing security tokens. Therefore, issuers create blockchain-based networks and protocols to issue token securities directly. Examples include real estate platforms like Kasa, SoYou, Musicow, and Tessa. There are several key stakeholders in Figure 1 as follows:

- Account management institutions: Issuers who do not meet specific requirements can issue tokenized securities through existing securities companies and banks that act as account management institutions. This approach is similar to conventional electronic securities, allowing existing security companies to participate in the distribution market with new business models.
- Digital exchange: Tokenized securities are traded through individual issuer platforms; however, starting in 2024, each platform will be traded through digital exchanges.
- Over-the-counter (OTC) brokerage firms: Brokerage for the multilateral trading of investment contracts and profit-sharing securities has been approved; these brokers have similar roles as account management institutions. To prevent conflicts of interest, securities issued, underwritten, or brokered cannot be distributed by the same firm, and self-contracting is prohibited.
- Depository and settlement institution: The Korea Securities Depository (KSD) manages tokenized securities and has a substantial regulatory and oversight role. Instead of directly regulating issuers, the KSD oversees account management institutions to protect investors.
- Investors: Investors are platform users who trade through digital exchanges and OTC brokerage firms.

The STO ecosystem in Korea can be categorized into four main stakeholder groups. The first group includes the issuer account management institutions, which have authority over issuance and distribution. These are mainly platform providers. Second, under the latest guidelines, account management institutions include security companies and banks operating in the financial industry. These institutions can issue and distribute tokenized securities for issuers who do not meet the requirements, acting as OTC brokers for profit-sharing and investment contract securities. Third, the KSD manages the total quantity of tokenized securities, and the Korea Exchange will pilot a digital securities market; both serve as regulatory bodies. Fourth, investors enter through digital exchanges and OTC brokerage firms, contributing to activating the STO ecosystem.

Business Models in the STO Industry

The STO industry has proliferated in terms of investor interest and the development of legal and institutional frameworks; however, the scalability of its revenue models faces persistent challenges. Analysis of international cases reveals four major revenue models, each presenting distinct opportunities and risks and illustrating best practices through both successful and failed ventures.

The first model is capital raising for companies. Digital assets like ICOs and STOs can become an efficient and inclusive means of capital raising for small and medium-sized enterprises (SMEs) (Block et al., 2021; Fisch, 2019; Momtaz, 2021a, 2021b). ICOs and STOs are increasingly considered alternatives to mainstream debt and equity financing (Bongini et al., 2022). These instruments are based on a direct peer-to-peer (P2P) mechanism, allowing entrepreneurial projects to raise funds by exchanging encrypted security tokens issued on a DLT system (Adhami et al., 2018; Lyandres et al., 2022). ICO investors typically acquire utility tokens linked to the rights to obtain products or services from the issuing company. In contrast, STO investors purchase security tokens that provide a share of future profits, voting rights, or ownership in the issuing company (Bongini et al., 2022). Security tokens are considered genuine financial assets subject to securities law regulations. Success in this area, however, hinges significantly on regulatory compliance and market positioning. A prominent example of success is Polymath, which facilitated approximately $60 million in STO funding starting in 2017 by providing blockchain infrastructure compliant with U.S. securities laws (Vilner, 2019). Its ST-20 standard, integrating features like transfer restrictions and investor accreditation checks aligned with SEC guidelines, exemplifies a proactive approach to regulation (Vilner, 2019). In contrast, Blackmoon Crypto represents a cautionary tale; despite raising $30 million via an ICO in 2017 with ambitions in the STO space, it ceased operations in 2020 (Abdel-Qader, 2020). Its downfall can be partly attributed to difficulties in adapting its model to evolving regulations, such as the EU's Fifth Anti-Money Laundering Directive, and reliance on less regulated frameworks (Abdel-Qader, 2020). This highlights a key best practice: integrating robust, automated compliance features directly into the technical infrastructure is crucial for navigating the complex and evolving regulatory landscape (Prior, 2023).

A second major model is the digital tokenization of private assets. This involves issuing and distributing previously illiquid private holdings, such as hedge funds, private equity, or corporate bonds, as digital tokens to enhance liquidity and broaden investor access. Singapore's Asia Digital Exchange (formerly iSTOX) serves as a strong example of successful institutional adoption. Operating under the Monetary Authority of Singapore's supervision since its approval in February 2020 (Pan, 2020), the platform has facilitated over USD 1 billion in cumulative tokenized transaction volumes as of April 2024. (Peck, 2025). Its status as a licensed capital markets services provider enabled innovations like fractional ownership and efficient settlement cycles for accredited investors (Pan, 2020). Conversely, the U.K.-based Smartlands Platform Ltd faced significant regulatory headwinds. According to a recent legal study,

consultation of the Financial Conduct Authority's (FCA) public register shows that Smartlands was an appointed representative of Shojin Financial Services Ltd up until its acquisition in 2019 and has not held its own FCA registration status since then (Prévost, 2023). More broadly, by the January 2021 AML/CTF registration deadline only nine cryptoasset firms achieved full registration, while the majority fell short of the FCA's custody and investor-protection standards (Wilmerhale, 2021). This underlined the difficulties in satisfying regulatory prerequisites, especially around custody arrangements and conflict-of-interest safeguards. A demonstrated best practice from successful ventures like Asia Digital Exchange is the strategy of partnering with established financial institutions and regulators (such as the Singapore Exchange and Temasek Holdings) to build essential trust and navigate complex regulatory requirements effectively.

The third model involves the tokenization of nonmonetary trust profit securities. This approach is particularly relevant in jurisdictions emphasizing robust investor protection, often blending traditional financial structures like trusts with blockchain technology. In South Korea, industry reports show that services offering electronic issuance and trading of beneficiary certificates of real estate management and disposal trusts have been designated as innovative financial services, reflecting the country's proactive approach to integrating blockchain within established legal frameworks for investor protection (Yoon et al., 2023). Kasa emerged as a successful platform in this domain within South Korea. Designated by the Financial Services Commission as an innovative financial service provider on May 2, 2019 (specifically for its blockchain-based issuance of mortgage-backed securities under the regulatory sandbox) (Financial Services Commission, 2019b). Kasa's Digital Asset-Backed Securities (DABS) model has democratized access to commercial real estate, allowing investors to participate with as little as KRW 5,000 (approximately USD 4) per DABS. Between 2020 and 2022, the platform raised a total of USD 19.26 million through offerings for three office buildings in Seoul (the Yeoksam Korea Technology Center, Yeoksam Londonville, and Seocho Gwell Tower) enabling a broad base of investors to benefit from fractional real estate ownership (Chow & Tan, 2022). While leveraging blockchain for transparency, technical reliability remains paramount. Harbor, a U.S.-based platform also engaged in real estate tokenization, encountered substantial operational issues during 2019-2020. Technical failures, reportedly stemming from infrastructure vulnerabilities like Docker container issues causing significant downtime (GoHarbor, 2019; GoHarbor, 2020), severely damaged investor confidence and illustrated the critical risks associated with technical fragility. This experience emphasizes the necessity of implementing rigorous technical standards as a best practice, including regular third-party audits of smart contracts and underlying asset valuations as pursued by Kasa, to ensure operational stability and mitigate counterparty risks, thereby avoiding the technical debt that hampered platforms like Harbor.

Finally, the fourth model is the tokenization of investment contract securities. This category, covering unique assets like artworks, intellectual property rights, and other contractual interests, offers considerable potential for market expansion but is fraught with legal and institutional uncertainties. Such assets often fall into complex regulatory classifications, necessitating meticulous structuring to comply with securities laws, especially concerning public offering and distribution regulations. Maecenas provided a landmark example in 2018 by tokenizing fractional ownership of an Andy Warhol artwork valued at $5.6 million on the Ethereum blockchain, attracting a global investor base (Maecenas, 2018). Its success was supported by a hybrid auction model and collaboration with a regulated art investment firm, which aided in managing price discovery and compliance. In stark contrast, a Singaporean STO project was abruptly halted by the Monetary Authority of Singapore in 2019 due to regulatory violations; specifically, the issuers promoted the offering via social media without adhering to prospectus requirements or obtaining necessary exemptions. This failure powerfully illustrates the perils of inadequate legal planning and non-compliance with securities marketing and disclosure rules (Monetary Authority of Singapore, 2019).

Platform operators in the STO ecosystem face the dual challenge of technological innovation and market penetration, requiring sophisticated integration of technology and marketing activities similar to challenges faced by service SMEs in emerging economies (Jayawardena et al., 2024). This integration becomes particularly complex when targeting different investor demographics, from tech-savvy millennials to traditional institutional investors. Consequently, a crucial best practice in this complex area is collaboration with regulated intermediaries or experts specific to the asset class, such as Maecenas' partnership with Dadiani Syndicate for art verification, to ensure asset legitimacy and navigate the nuanced regulatory demands associated with novel asset types.

Analysis of these international cases suggests that successful STO ventures consistently integrate robust compliance frameworks adaptable to regional laws, often fostered through partnerships with incumbent financial institutions or regulated entities, and maintain transparency in asset valuation and technical operations. Conversely, failures often stem from regulatory complacency, inadequate legal planning, technical fragility, or a fundamental misalignment with investor protection standards. Even established firms exploring tokenization, such as the IBM-IPwe patent tokenization initiative, face hurdles related to custody, liquidity, and the unique regulatory challenges posed by novel asset classes (Maier, 2021), emphasizing the ongoing complexities in scaling these business models.

Previous Research on STO

Digital assets, especially ICOs and STOs, are emerging as innovative and inclusive mechanisms for SMEs to raise capital. Due to their efficiency and accessibility, digital assets have become alternatives to traditional financing methods, such as debt, equity, and venture capital (Block et al., 2021; Fisch, 2019; Kondova & Simonella, 2019; Momtaz, 2021a, 2021b). STOs can leverage peer-to-peer

transactions on a DLT system, and they are expected to experience significant growth in this market segment (compared to ICOs), mainly due to enhanced investor protection (Lambert et al., 2022; Mazzorana-Kremer, 2019). Mazzorana-Kremer (2019) distinguished STOs from ICOs, emphasizing their potential to reduce intermediary processes and lower transaction costs, similar to traditional securities. He argued that an STO's success could be comparable to that of an initial public offering, depending on the quality of the issuer and the robustness of the secondary market platform.

Lambert et al. (2022) conducted an important empirical survey of 106 STOs, identifying success factors such as voting rates, noting that soft caps (minimum fundraising amounts) and the incorporation of entities in specific jurisdictions negatively correlated with fundraising outcomes. Recent analyses have expanded these findings by exploring how signaling affects STO success (Ante & Fiedler. 2020) and investigating the real estate token market, providing insights into investor behavior and portfolio diversification (Kreppmeier et al., 2023). Although these studies are in their early stages, they highlight the rapidly evolving nature of STO research, which has been historically limited to U.S. market practices and the overlap between ICOs and STOs.

Most existing literature overlooks the multifaceted perspectives of key stakeholders in the STO ecosystem, such as issuers, investors, regulators, and technology platforms, as shown in Table 1. This oversight limits the scope of practical solutions and does not address the broad ecosystem that impacts STO success. This study aims to bridge this gap by integrating a broader range of stakeholder perspectives and diversifying the geographical context of STO research, focusing specifically on the South Korean market. This study aims to provide a more comprehensive analysis by addressing the specific roles of various stakeholders, such as the key challenges faced by issuers, the role of regulators in investor protection, and how technology platforms can support regulatory compliance.

Table 1. Previous Research on Security Token Offerings

Topic	Researcher	Key findings
Study on the STO legal and institutional framework	Mendelson (2019)	Presents a legal framework and analysis method based on the aggressive case-by-case approach proposed by the SEC in the DAO report.
	Guseva (2020)	Proposes a new approach to the applicability of securities law to digital assets; the clarity of this framework benefits courts, regulatory authorities, and market participants.
Conceptual study of STO	Ante and Fiedler (2020)	Provides an overview of security tokens and the STO model for corporate fundraising.
	Lambert et al. (2022)	Presents an overview of the STO market and analyzes the success factors of STOs; explores the impact of digital securities on corporate finance.
Analysis of success factors through STO case studies	Bongini et al. (2022)	Uses a unique sample of STOs from 2017 to 2021, analyzing the content of white papers and identifying campaign success factors using Latent Dirichlet Allocation.
	Kreppmeier et al. (2023)	Collects data on 173 real estate tokens in the United States from 2019 to 2021 and analyzes the determinants of success for STOs, secondary market transactions, and daily aggregated capital flows.

Note. STO = security token offerings; SEC = U.S. Securities and Exchange Commission; DAO = decentralized autonomous organization.

METHODOLOGY

This study employs a qualitative, interview-based exploratory approach to investigate the challenges and activation strategies for the STO market in South Korea. An exploratory qualitative methodology is particularly well-suited to this research context (i.e., the early stage of STO adoption and the limited availability of structured secondary data), as it allows for the examination of complex systems involving diverse and interdependent stakeholders. In addition, it supports the identification of industry-specific challenges in an emerging market where existing academic literature remains underdeveloped. Through in-depth interviews with practitioners actively engaged in the STO space, this method enables the extraction of expert insights that would be difficult to capture through quantitative approaches alone. Based on the interviews with various stakeholders, we used the CLD to illustrate the influential relationships among the factors within the stakeholder ecosystem. The CLD has been used to analyze and explain the influential relationships between factors by employing system dynamics (SD; Sterman, 2001).

Interview-Based Qualitative Study

Data collection for the interview-based exploratory study was conducted in two main phases. First, primary data was collected from media articles, reports, and literature on STOs. We used the collected primary data and the stakeholders (Figure 1) to gather secondary data through expert interviews from the perspectives of platform operators, account management institutions, regulators, and investors, focusing on STO issuance and distribution. The interview participants comprised 35 individuals, including 20 experts

(eight executives from STO platform companies selected under the regulatory sandbox; seven working-level professionals responsible for STOs at securities companies acting as account management institutions; and five experts from regulatory institutions, including government officials and compliance officers from financial firms). We also interviewed 15 individual investors who have invested in traditional financial products like funds and STOs.

Participants were selected through purposeful sampling to ensure domain relevance and representation across all stakeholder categories central to STO adoption. Platform operators and securities companies were chosen based on their involvement in the Korean Innovative Finance System (regulatory sandbox), which allowed us to engage firms operating directly in regulated STO pilots. The investor group was selected through screening for relevant experience in both traditional financial markets and STO products, ensuring that their responses reflected a realistic understanding of risk, returns, and comparative investment strategies. Although limited to 35 participants, the sample reflects a diverse and functionally representative subset of Korea's STO ecosystem.

Interviews used stakeholder-specific questions, with platform operators focusing on STO activation factors from their perspective. The interviews focused on asset tokenization for STO issuance, collaboration with account management institutions to increase the attractiveness of the secondary market, efforts to comply with regulatory guidelines for investment products, and methods to gather investor interest.

For security firms acting as account management institutions, the interviews aimed to identify factors contributing to activating the STO distribution market. These factors included collaboration with platform operators for a more active secondary market, ways to facilitate the issuance and distribution of products by nonqualified issuers, methods of applying investor protection measures required by supervisory authorities, and marketing strategies linked to existing investors.

Interviews with regulatory institutions focused on the fundamental principles of investor protection and the scope of their application as stated by regulatory authorities. Additionally, interviews with compliance officers from financial firms concentrated on strengthening factors for investor protection through measures to prevent incomplete sales and internal control standards. The investor interviews were conducted with individuals who had invested directly in STOs and had experience investing in financial products, such as funds and stocks. These interviews helped determine factors that could increase STO investors, including the competitiveness of STOs compared to other financial products, the investors' understanding of the investment product, and satisfaction with the rate of return.

Each interview was digitally recorded with the interviewee's consent; when recording was impossible, we used a summary of the questions and answers as a supplement. Interviews were typically conducted face-to-face and ranged from 50 to 80 minutes. Telephone interviews were conducted and recorded for documentation when face-to-face interviews were impossible.

We initially contacted stakeholders by phone or email to request an interview, and we sent the core questionnaire to those who agreed to participate, which ensured a smooth and legitimate interview process (Shaw & Wainwright, 2007). Questions specific to each stakeholder group were added to derive more concrete activation plans for STOs.

The four groups of stakeholders were asked a common question: "What is most necessary for the activation of the STO business?" This question helped us identify the priority factors from each stakeholder's perspective, and these factors served as the basis for deriving the activation plans. By clearly analyzing the roles and priority factors of platform operators, account management institutions, regulators, and investors, we determined the pathways to activate the STO ecosystem.

To construct the CLD from the interview data, we applied grounded theory techniques. Open coding was first conducted to identify factors relevant to STO issuance and distribution from each stakeholder group. This yielded approximately 81 initial codes, which were consolidated into 25 thematic categories through axial coding (e.g., "Token Design Transparency," "Regulatory Flexibility," "Investor Protection Measures"). From these categories, we identified 16 core variables used in constructing the CLD, as shown in Table 2. These variables were selected based on frequency, conceptual relevance, and stakeholder emphasis. The relationships among variables were then mapped based on recurring causal patterns in the interviews, forming four key feedback loops. These loops are described in detail in the Discussion and Implications section.

Table 2. Open Coding Results

Key variable	Platform operator		Account management institution		Regulatory institution		Investor	
	Frq	%	Frq	%	Frq	%	Frq	%
Increase in investors	47	12.43	41	10.35	46	13.45	32	9.17
Increase in STO total assets	37	9.79	8	2.02	4	1.17	4	1.15
Underlying asset commercialization	36	9.52	31	7.38	15	4.39	45	12.89
Secondary market activation	24	6.35	54	13.64	11	3.22	6	1.72

Key variable	Platform operator		Account management institution		Regulatory institution		Investor	
	Frq	%	Frq	%	Frq	%	Frq	%
Market preemption	17	4.5	45	11.36	9	2.63	26	7.45
Investor protection	15	3.97	28	7.07	58	16.96	24	6.88
Risk resolution	24	6.35	18	4.55	35	10.23	21	6.02
Micro-investment	28	7.41	24	6.06	34	9.94	68	19.48
Convenience	15	3.97	29	7.32	12	3.51	59	16.91
Blockchain technology	35	9.26	15	3.79	5	1.46	21	6.02
Regulatory limitations	24	6.35	10	2.52	6	1.75	3	0.86
Competitiveness	9	2.38	9	2.27	21	6.14	7	2.01
Specialization	12	3.17	20	5.05	12	3.51	16	4.58
Investment contract securities	25	6.61	24	6.06	30	8.77	3	0.86
Stability	17	4.5	32	8.08	25	7.31	12	3.44
Innovation	13	3.44	8	2.02	19	5.56	2	0.57
Total	378	100	396	100	342	100	349	100

Note. Frq = frequency; STO = security token offerings.

To ensure reliability and transparency in model construction, two independent researchers conducted the coding and loop mapping process, followed by comparison and resolution of discrepancies. We also conducted member checking with three interviewees from different stakeholder groups to validate the plausibility of the derived CLD structure. The resulting model, which visualizes the key feedback loops identified across stakeholder perspectives, is presented in Figure 2.

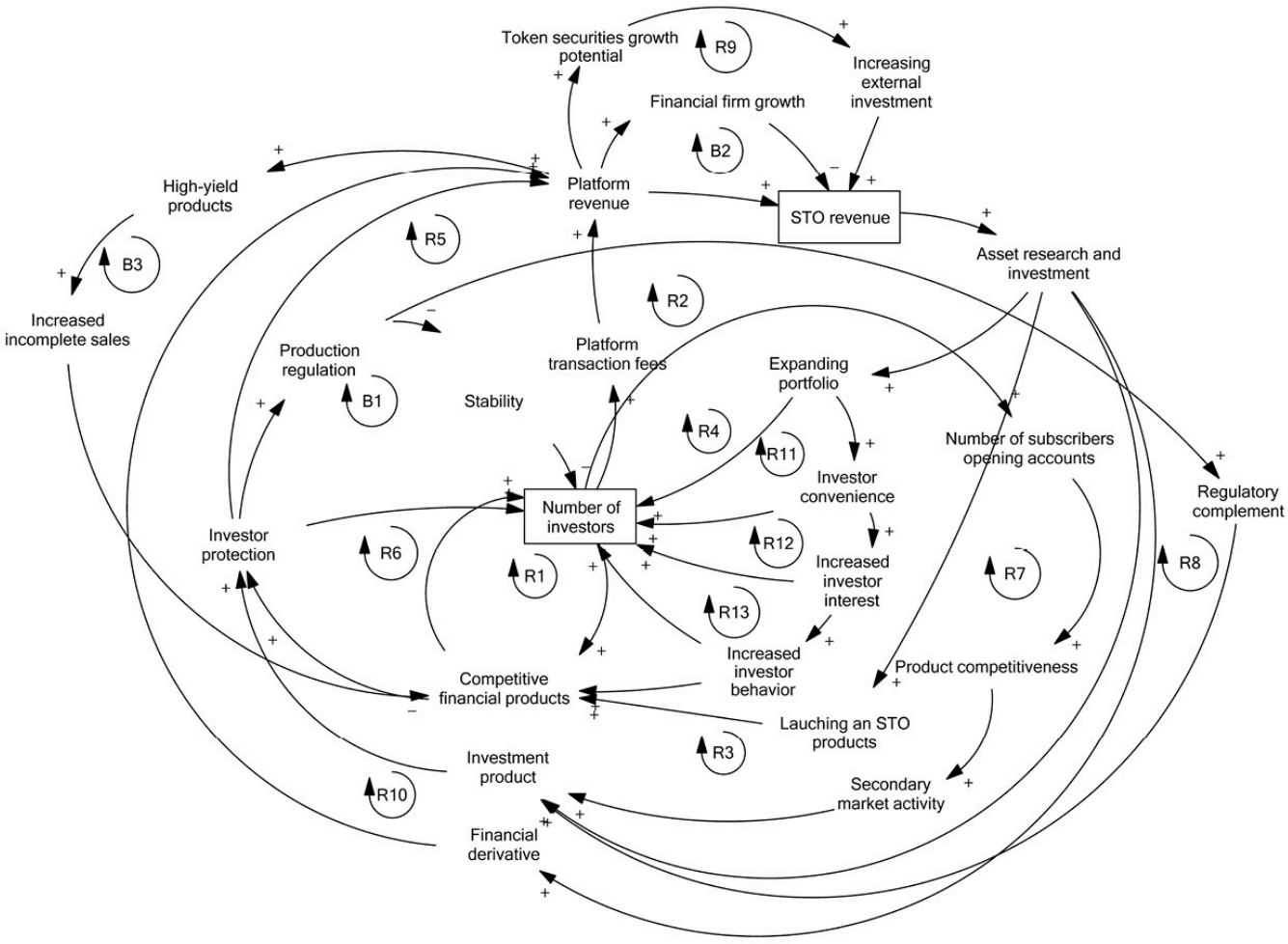

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Figure 2. Derived Final Causal Loop Diagram and Issues

Note. STO = security token offerings.

While qualitative methods offer rich and nuanced insights, we acknowledge that the lack of quantitative data is a limitation of this study. The potential for biases stemming from subjective interpretation and limited generalizability also exists. To address this, future research may incorporate survey-based validation, market performance data, or regulatory databases to complement and triangulate the findings derived from interviews.

SD: CLD

This study employs CLDs, a key qualitative tool within the SD methodology (Fang et al., 2018; Größler et al., 2008), to map the complex web of relationships within the STO ecosystem. CLDs visually represent how different variables influence each other through directional arrows, indicating either positive (+) or negative (-) interactions (Lee et al., 2012). When these interconnected causal links form a closed circuit, they create feedback loops (Akkermans & van Helden, 2002). These loops can be reinforcing (positive), amplifying change, or balancing (negative), counteracting change and seeking equilibrium (Sutanto et al., 2008). By utilizing this qualitative modeling method, our research aims to visualize the underlying dynamics of the STO ecosystem. This allows us to understand and anticipate how various interactive factors collectively shape complex outcomes within this emerging market, a benefit highlighted in similar contexts (e.g., Choi & Kim, 2020).

This study adopted a qualitative approach utilizing SD modeling, focusing on CLD to analyze and interpret the complex interactions within the STO ecosystem. Similar multi-stakeholder, interview-based CLD approaches appear in other nascent digital-content or platform-driven industries (Ammirato et al., 2022; Choi & Kim, 2020). For instance, Choi and Kim (2020) applied in-depth interviews and CLDs to dissect the multi-channel network ecosystem—an emerging sector comprising creators, brands, agencies, platforms, and users—and derived activation propositions for sustainable industry growth. Their findings underscore how identifying each stakeholder's unique motivations and constraints can illuminate system-level barriers and enablers. Building on this approach, Linzalone et al. (2023) demonstrated the effective use of CLDs in crowdfunding research, particularly in financial technology, by uncovering the causal structures and feedback mechanisms driving crowdfunding dynamics. Their findings highlight how a system-level perspective reveals interactions between stakeholders and funding flows, offering valuable insights into managing capital acquisition stages. The STO market, characterized by its novel technology, evolving regulatory landscape, and diverse stakeholder interests, presents a prime example of a complex adaptive system where CLDs can effectively illuminate non-obvious leverage points and the potential unintended consequences of interventions.

Drawing on these precedents, we similarly structured our research process into four phases: (1) data collection, (2) CLD development, (3) validation and improvement, and (4) analysis and application. Each step allowed us to map out reinforcing and balancing loops in the STO market, grounded in the subjective insights of our stakeholder interviews.

First, data collection involved a thorough literature review and semi-structured interviews with domain experts to gather insights into the variables influencing the STO ecosystem. This approach reflects Cassidy et al. (2022), who argued that CLD should be used to visualize and decompose the behavior of complex systems in resource-constrained environments. The data collection phase identifies diverse factors impacting the STO business, including regulatory issues, technological developments, stakeholder collaboration, and market characteristics. Specifically, each variable's unique characteristics and influence are extracted to serve as the foundational data for CLD construction.

The second phase involved CLD development. We used an iterative development and stakeholder engagement strategy similar to that of Urban and Hornung (2021), who mapped causal relationships in airline dynamics within long-distance markets. Similarly, this study identified key STO domain variables and visualized feedback loops and system behaviors through CLD to comprehensively represent how each variable interacts. The collected data were also analyzed using the approaches of Ammirato et al. (2022) and Kim et al. (2021), allowing us to identify patterns, feedback loops, and leverage points within the STO ecosystem. These insights were conceptualized into the CLD, highlighting the reinforcing (positive) and balancing (negative) loops behind the system behavior.

In the third phase, the validation and improvement processes ensured that the CLD model accurately reflects the real STO environment. This phase included validation interviews with industry stakeholders, similar to Kim et al. (2021), to assess the impact of technological innovation in the automotive retail sector. Expert feedback is crucial in enhancing the diagram's comprehensiveness and accuracy and reflecting realistic and nuanced issues presented by stakeholders, thereby improving the CLD model's representation of the complex STO business ecosystem.

In the final phase of analysis and application, the completed CLD served as foundational data for analyzing system behavior and identifying critical feedback loops that impact the STO business's growth, sustainability, and challenges. This analysis focused on understanding how various factors within the ecosystem interact and applied CLD to understand business model innovation (Ammirato et al., 2022) and the ripple effects of technological innovation (Kim et al., 2021). This study analyzed which strategic

factors influence system performance the most within the STO industry, and we present specific strategic recommendations based on these findings.

RESULTS

This study examined the factors influencing the activation of the STO industry in South Korea through the lens of four interconnected stakeholder groups. Rather than operating in isolation, these stakeholders—platform operators, account management institutions, regulatory institutions, and individual investors—create a complex web of relationships where each group's actions trigger responses throughout the entire ecosystem. The analysis employed a systems-thinking approach, developing CLDs to visualize these dynamic interactions and reveal the underlying story of how the STO market either thrives or struggles.

Core Findings from Stakeholder Analysis

The stakeholder interviews revealed a fascinating pattern of shared goals pursued through divergent strategies. Investor acquisition emerged as the most prominent theme across all groups, evidenced by the high frequency of related references in interview transcripts (see Table 2). However, beneath this apparent consensus lies a more complex story of competing priorities and misaligned incentives.

The accessibility revolution represents perhaps the most significant shift in traditional investment paradigms. Keywords such as micro-investment and convenience dominated investor responses (19.5% and 16.9%, respectively), reflecting a fundamental change in how people access financial markets. As one platform operator explained, tokenization acts like a “container” that makes previously exclusive investments accessible to ordinary people, allowing them to buy “just one-fifth or one-hundredth” of high-value assets. This democratization of investment creates powerful growth dynamics when executed effectively.

Yet stakeholder priorities diverge significantly despite shared objectives. Platform operators focus on growth and innovation, frequently referencing underlying asset commercialization (9.5%) and blockchain technology (9.3%) as they seek to differentiate their offerings through partnerships in entertainment and gaming sectors. Securities firms, acting as account management institutions, concentrate on market dominance and secondary market activation (13.6%), recognizing that liquid trading venues are essential for their commission-based revenue models.

Regulators tell a different story entirely, emphasizing investor protection frameworks (17.0%) and risk-resolution mechanisms (10.2%) over technological innovation. Their narrative centers on preserving market integrity and safeguarding public trust—priorities that sometimes conflict with the growth ambitions of other stakeholders. Investors themselves reveal the ultimate test of whether this ecosystem is working. While expressing keen interest in micro-investment opportunities and convenience, they also voice concerns about unclear return expectations and underdeveloped secondary markets. This investor anxiety highlights a critical gap between the promise of STOs and their practical implementation.

Conceptual Variations and the Language Divide

The analysis revealed that stakeholders often use different terminology to describe similar underlying concepts, creating what amounts to a language divide within the ecosystem. The concept of market liquidity provides a telling example. Securities firms discussed “secondary market activation” far more frequently (13.6%) than platform operators (6.4%) or regulators (3.2%).

This linguistic variation reflects deeper philosophical differences. Securities firms frame liquidity in terms of establishing traditional secondary trading infrastructure, similar to OTC markets. Platform operators, however, associate liquidity more with broadening the diversity of assets available on their primary platforms. These different mental models create communication barriers that can impede ecosystem coordination.

The Blockchain Technology Paradox

A particularly striking finding emerges from South Korea's approach to blockchain implementation. The story here is one of regulatory caution creating unintended consequences. Unlike international practices that leverage public blockchains like Ethereum, South Korea's framework mandates private, permissioned distributed ledgers that function primarily as auxiliary record-keeping systems.

The authoritative record remains centrally maintained by the KSD, with private ledgers essentially mirroring this data. As one securities firm manager explained, “The guideline states not to use public networks for STOs... We are limited to deploying private networks domestically. This lack of communication with the United States and other international standards is a limitation.”

This technical constraint tells a larger story about the tension between innovation and control. While designed to enhance investor protection and compatibility with existing financial infrastructure, this approach significantly restricts interoperability with global

blockchain ecosystems. The result is a system that prioritizes domestic regulatory compliance over international competitiveness—a choice with profound implications for market development.

Global Applicability: Universal Themes in Local Contexts

Despite South Korea's specific regulatory context, the fundamental dynamics we identified appear universal. The tension between fostering innovation and ensuring investor protection exists across all jurisdictions grappling with tokenized assets. The challenge of establishing liquid secondary markets remains critical regardless of regulatory framework. The need for investor education about technologically complex financial instruments is a global concern that transcends national boundaries.

The comparison with international platforms like RealToken illustrates these universal challenges. RealToken's use of public blockchains enables global investor participation and cross-border capital flows—benefits that South Korea's private-chain model currently cannot capture. Yet both systems grapple with the same fundamental question: How do you balance innovation with investor protection while building sustainable market infrastructure?

The Two Critical Barriers: A Tale of Missing Infrastructure

Synthesizing insights across all stakeholder perspectives reveals two critical impediments that form the backbone of our ecosystem story:

Barrier 1: The Liquidity Drought

The absence of functional secondary markets emerged as the dominant concern across all stakeholder groups. This issue particularly resonated with securities firms, where related terms appeared in 13.6% of their discourse, and with investors who highlighted the need for viable exit mechanisms.

The story here is straightforward but profound: without liquid trading venues, STOs become “investment traps” where money goes in but cannot easily come out. As one investor described, “Trading was active during the initial offering, but after about three months, there was barely any trading.” This liquidity drought erodes investor confidence and significantly weakens STOs' competitive position relative to traditional, more liquid asset classes.

Barrier 2: The Knowledge Gap Crisis

The second barrier tells a story of information asymmetry and inadequate investor protection. Many potential investors lack comprehensive understanding of STO mechanisms, including the nature of often-complex underlying assets (real estate, artwork, intellectual property) and associated risk-return profiles.

This knowledge deficit becomes particularly dangerous when combined with marketing that emphasizes high returns from small investments. The result is an increased risk of ill-informed decision-making and potential financial losses. As one compliance officer noted, “Transparency is the most crucial aspect... Investments must be transparent in a broad sense.”

These two barriers interact in destructive ways. Limited investor knowledge makes people more susceptible to unrealistic return expectations, while poor liquidity makes it difficult for investors to correct their mistakes by exiting positions. Together, they create an environment where trust—the foundation of any financial market—becomes increasingly difficult to maintain.

SD: How Success Builds on Success (or Failure Compounds)

The causal loop analysis reveals how the STO ecosystem operates as a system where small changes can create large effects. When platforms successfully lower barriers to investment, they don't just gain more users—they gain resources to lower barriers even further, creating self-reinforcing cycles of growth. Conversely, when problems emerge, they tend to cascade through the system, amplifying negative outcomes.

The story of platform growth illustrates this dynamic clearly. Simplified account opening processes lead to increased investor inflow, which generates platform revenue that can be reinvested in product diversity and user experience improvements. This creates what platform operators describe as a “virtuous cycle” where success breeds more success.

However, this same dynamic works in reverse when trust breaks down. Poor secondary market liquidity leads to investor dissatisfaction, which reduces new investor acquisition, which limits platform resources for improvement, which further degrades the user experience. Understanding these feedback loops helps explain why some STO platforms thrive while others struggle to gain traction.

The Complete Ecosystem Story

Figure 2 presents our comprehensive CLD, which visualizes the complete ecosystem story. This CLD illustrates the complex interplay between investor behavior, platform dynamics, regulatory frameworks, and product development in the ecosystem of STOs. At the core of the system is the "number of investors," which acts as a central driving force in multiple reinforcing loops. As the number of investors grows, it stimulates the development of competitive financial products (**R1**), increases platform transactions and revenue (**R2**), and encourages the launch of more STO products (**R3**). These in turn lead to expanding investment portfolios (**R4**), improved investor convenience (**R11**), and heightened investor interest and engagement (**R12**, **R13**), creating a self-reinforcing cycle of platform growth and product innovation. Moreover, increased STO revenue supports token securities and external investments (**R9**), which further enhances financial firm growth. Investor protection mechanisms (**R6**) and regulatory complements (**R7**, **R8**) increase trust, product competitiveness, and account openings, further expanding the investor base and supporting continuous growth.

However, the CLD also incorporates balancing feedback loops that help maintain systemic stability. As platform activity increases, it may lead to regulatory interventions through production regulation to ensure market stability (**B1**). At the same time, rapid growth in STO revenue might trigger self-correcting investment strategies to prevent overheating of the system (**B2**). Furthermore, while high-yield financial products can attract investors and increase revenue, they also carry risks such as incomplete sales, which may eventually undermine investor trust and limit growth (**B3**). These balancing loops demonstrate the importance of safeguards and oversight to counterbalance the strong reinforcing forces in the system. Overall, the diagram highlights a dynamic system where innovation and growth are continuously driven by investor engagement and product evolution, while regulatory and protective mechanisms ensure long-term sustainability and trust. The diagram reveals four critical feedback loops that determine whether the STO market thrives or stagnates:

Loop R11, R12, and R13 Tell the Story of Investor Attraction

When platforms successfully enhance convenience and accessibility, they attract younger demographics and female investors who value micro-investment opportunities. This demographic shift creates new investment patterns and portfolio preferences, potentially transforming the broader financial landscape.

Loop B1 Reveals the Regulatory Tension

Account management institutions worry that excessive regulation will limit asset diversity and contract the distribution market, while regulators prioritize investor protection over market expansion. This fundamental tension shapes much of the ecosystem's development trajectory.

Loop R6 Demonstrates the Trust-Building Cycle

As investor numbers grow, regulators enhance protection policies, which increases investor confidence and attracts more participants. This virtuous cycle is essential for sustainable market development.

Loop B3 Highlights the Incomplete Sales Risk

Platform operators' pursuit of high-return products to maximize revenue can increase the risk of incomplete sales, making products less competitive against conventional financial instruments.

An Ecosystem Awaiting Coordination

The story that emerges from our analysis is one of enormous potential constrained by coordination challenges. Each stakeholder group has rational reasons for their priorities, but their individual optimization strategies don't necessarily lead to system-wide optimization. Platform operators need growth, securities firms need liquidity, regulators need protection, and investors need education—but achieving all these goals simultaneously requires a level of coordination that the current system has not yet achieved.

The path forward lies not in choosing between innovation and protection, but in finding ways to achieve both through coordinated action. This means developing regulatory frameworks that enable rather than constrain technological innovation, creating market infrastructure that serves all stakeholders' needs, and building investor education programs that enable informed participation rather than uninformed speculation.

The Korean STO ecosystem stands at a crossroads. With the right coordination mechanisms, the system's inherent feedback loops could drive sustained growth and innovation. Without such coordination, these same dynamics risk creating a cycle of disappointed expectations and missed opportunities. The choice of which story unfolds depends on stakeholders' willingness to align their individual success with the ecosystem's collective prosperity.

DISCUSSION AND IMPLICATIONS

Discussion and Propositions

This research sought to analyze the structure and dynamics of South Korea's emerging STO industry through a systems-thinking lens. By employing CLDs to map the complex interactions and feedback mechanisms among key stakeholders, this study offers a holistic, dynamic perspective that enhances the existing STO literature. Unlike studies focusing narrowly on technology, regulation, or specific asset types, our approach reveals how these elements interrelate to collectively drive or impede market development. The identification of core system tensions (e.g., innovation versus protection, platform expansion versus market stability) and critical barriers (secondary market liquidity, investor knowledge gaps) provides a structured framework for understanding the challenges inherent in institutionalizing STOs, applicable not only in Korea but likely mirrored in other jurisdictions.

The enduring relevance of these findings was corroborated through a focus group discussion conducted one year after the initial interviews, involving industry practitioners and domain experts. Focus group discussion participants affirmed the continued centrality of the identified issues, particularly highlighting the persistent challenges surrounding secondary market development and investor education.

The following discussion builds upon the two critical barriers previously highlighted (the absence of functional secondary markets and investor protection) and integrates further insights from our comprehensive stakeholder analysis to delineate four principal issues. These issues, which encompass the identified barriers and address other vital aspects for market activation, are then translated into actionable propositions and recommendations designed to foster a sustainable STO ecosystem. These issues and propositions are summarized in Table 3.

Table 3. Security Token Offerings Industry Activation Propositions

No	Problem	Proposition
1	How do we create competitive products based on diverse underlying assets?	Research and commercialization of assets that qualify as investment contract securities are needed.
2	What products can be issued to promote distribution and market activation?	Establish a system where platform operators not licensed as securities companies can issue and distribute financial products.
3	How to enhance investor protection?	Comprehensive disclosure and mandatory transparency are necessary.
4	How do we alleviate investor anxiety about incomplete sales?	The regulatory authorities should adopt proactive and stringent oversight.

Note. No = number.

Issue 1: Developing Competitive Products with Diverse Underlying Assets

One of the central challenges facing the Korean STO market is its limited diversification in underlying assets, with an overreliance on real estate income trusts. This narrow focus not only restricts market scalability but also limits its appeal to a broader spectrum of investors, particularly younger generations seeking more dynamic and innovative investment opportunities.

To address this challenge, we propose that market participants prioritize research into and commercialization of a more diverse set of underlying assets that are suitable for tokenization as investment contract securities. Promising candidates include intellectual property rights, entertainment content revenues, and fractionalized equity in private companies. These asset classes offer the potential to better align with investor demand and expand the STO market's relevance across different segments.

Based on this proposition, we recommend that platform operators, in partnership with securities firms, actively innovate in the design and structuring of STO products. By leveraging the technological affordances of DLT and smart contracts, they can introduce features such as automated dividend distribution, programmable cash flow rights, and interactive ownership experiences. Furthermore, regulatory authorities should provide clear guidelines for asset classification in tokenization processes and utilize regulatory sandboxes to facilitate controlled experimentation with novel product types. Such efforts are essential to achieving product diversification, which is a critical driver of competitiveness and sustainable growth in the STO ecosystem.

Issue 2: Activating the Distribution Markets

A major challenge hindering the development of the Korean STO market is the absence of a regulated and sufficiently liquid secondary market. This structural deficiency critically undermines investor confidence by limiting the feasibility of exit strategies, thereby constraining the practical utility of STOs as tradable investment instruments.

To overcome this limitation, we propose the development of accessible and trustworthy infrastructure for secondary trading. This could include the formal licensing of specific platforms or the creation of a structured framework that enables effective collaboration

between unlicensed technology providers and licensed financial intermediaries, such as securities firms. Such an approach would help bridge the regulatory gap between innovation and compliance.

In line with this proposition, we recommend that regulatory efforts prioritize the establishment of clear operational pathways for secondary market activities. This may involve integrating STO trading within the existing financial system or establishing new rules governing dedicated digital asset exchanges or OTC platforms. Importantly, expanding the scope of tradable tokenized assets and enabling participation from a broader spectrum of investors are both essential for achieving the critical mass of trading activity needed for market viability. Moreover, we suggest that regulators reexamine the implications of the current private-chain mandate. While intended to enhance oversight, this constraint may inadvertently inhibit integration with larger, more liquid international markets, thereby limiting the depth and global relevance of the domestic STO ecosystem.

Issue 3: Strengthening Investor Protection through Transparency

A critical challenge facing the Korean STO market is achieving an appropriate balance between promoting market innovation and ensuring robust investor protection. This tension is particularly pronounced given the technical complexity inherent in STOs and the lingering skepticism caused by negative experiences in the broader virtual asset ecosystem.

To address this concern, we propose the implementation and enforcement of mandatory standards for comprehensive disclosure and transparency throughout the STO lifecycle—from issuance to post-issuance operations. Transparent and consistent communication regarding asset structure, risk factors, and performance metrics is essential to mitigating information asymmetry and safeguarding investor interests.

Based on this proposition, we recommend the use of advanced technologies, such as DLT and smart contracts, to automate and secure the disclosure process. These tools can facilitate immutable, real-time access to information about the underlying assets, their financial performance, and any operational developments. From a global information management perspective, the implementation of robust transparency mechanisms in STOs requires comprehensive information security management frameworks that extend beyond technical solutions. As Bolek et al. (2023) demonstrate in their analysis of e-business environments, information security management is not just about implementing technical measures, but mostly about management processes that protect information assets from diverse threats. In the context of STOs, this means that while blockchain technology provides technical transparency, platforms must also implement systematic information security management systems that address the complex global nature of digital asset ecosystems. The global reach of STO platforms creates particular challenges, as “perceptions of privacy, trust, risk, and fair information practices vary across cultures, and differences in national regulation create challenges for global information management strategies” (Benamati et al., 2021, p. 131). This underscores the need for STO platforms to adopt comprehensive, process-oriented approaches to information security that can accommodate diverse regulatory environments while maintaining investor protection standards.

Furthermore, regulatory authorities should define specific disclosure requirements that reflect the complexity of STOs while drawing upon established financial reporting frameworks, such as those used for mutual funds. These may include standardized formats for risk disclosures, periodic performance reporting, and independent audits. By institutionalizing such measures, regulators can foster investor trust and support the development of a transparent, credible STO market.

Issue 4: Addressing Incomplete Sales and Mitigating Investor Anxiety

An ongoing challenge in the Korean STO market is the significant investor confusion surrounding STO mechanics, associated risks, and realistic return expectations. This confusion is often compounded by marketing narratives that emphasize high yields from micro-investments, which can result in “incomplete sales” and erode investor trust in the market’s credibility.

To mitigate this issue, we propose a dual-pronged strategy that combines proactive regulatory oversight of STO issuance and marketing practices with systematic efforts to enhance investor financial literacy. Improving investor comprehension of STO products is essential for fostering informed decision-making and sustaining long-term market participation.

In accordance with this proposition, we recommend that regulatory bodies apply levels of scrutiny to STO offerings comparable to those used for traditional securities such as initial public offerings. This should include stringent evaluations of disclosure clarity and the accuracy of promotional materials. At the same time, platform operators, securities firms, and relevant industry associations must commit to the development and dissemination of accessible, unbiased educational resources. These materials should clearly explain STO structures, the specific risks involved—particularly regarding liquidity constraints—and the range of reasonable return expectations. Although blockchain features such as transparent settlement and traceability may enhance procedural trust, they cannot substitute for a well-informed investor base. Closing this knowledge gap through targeted education is a foundational step toward sustainable STO adoption and is critical for preventing premature disillusionment with the market.

Limitations and Future Research Directions

This study has several limitations that affect the generalizability of findings. Methodologically, the qualitative approach and 35-participant sample, while functionally representative of Korea's STO ecosystem, introduces potential interpretation bias and limits statistical generalization. The cross-sectional design captures the market at a specific developmental stage, which may not reflect dynamics in more mature STO markets.

Contextually, our findings are embedded in South Korea's specific regulatory framework, particularly the private blockchain mandate and centralized custody approach through KSD, which differs significantly from markets allowing public blockchain implementations (e.g., United States, Switzerland) or decentralized custody solutions. The focus on investment contract securities and real estate profit securities may not apply to equity tokens, debt instruments, or hybrid products that could exhibit different stakeholder dynamics.

Regulatory environment constraints limit cross-jurisdictional applicability. While core challenges like the innovation-protection tension and secondary market liquidity needs likely apply globally, specific compliance requirements, blockchain implementation approaches, and investor demographic preferences (e.g., the MZ generation focus) are context-specific. Markets with mature STO regulations may exhibit different stakeholder power dynamics and risk-return profiles.

Data limitations include the lack of comprehensive quantitative metrics (investor numbers, transaction volumes) due to nascent market infrastructure, and potential self-reporting bias in stakeholder interviews. The domestic focus and regulatory sandbox context may not reflect dynamics in fully regulated markets or other jurisdictions. This study acknowledges the inherent limitations of qualitative research and the use of CLD, namely the potential for subjective interpretation of complex systems and the risk of oversimplification of actual dynamics. This study seeks to ensure reliability through stakeholder participation, cross-validation of research results, and a transparent documentation process to mitigate these limitations.

Future research should focus on longitudinal validation as markets mature, comparative analysis across jurisdictions with different regulatory approaches, and quantitative validation through market data analysis. Immediate priorities include investigating Korean content tokenization potential, assessing digital exchange integration impacts, and developing systematic benchmarks against international STO markets. The successful activation of STO markets will require continued research across diverse regulatory environments and token types to identify truly universal principles versus context-specific factors.

Addressing these areas can contribute to a more comprehensive understanding of the STO market and identify effective strategies for market activation and long-term industry growth. Specifically, enhancing investor protection, product diversification, and the convergence of regulation and technology can help the STO market evolve into a more sustainable and trustworthy investment marketplace.

Implications for Research and Practice

This study offers important contributions to both academic research and industry practice by advancing a structured, stakeholder-centered understanding of the STO ecosystem, grounded in systems thinking and qualitative inquiry. Through the application of a CLD methodology, the study uncovers complex interdependencies and feedback mechanisms that shape STO market development—dimensions that have remained largely underexplored in extant literature, which has tended to focus on comparisons with ICOs or relied heavily on conceptual typologies (Adhami et al., 2018; Fisch, 2019; Howell et al., 2020).

From a research perspective, this study extends the application of SD into the domain of emerging financial technologies, offering a replicable methodological approach for analyzing the evolution of digital asset ecosystems (Ammirato et al., 2022; Kim et al., 2021). The stakeholder-inclusive framework—incorporating perspectives from platform operators, custody providers, regulatory agencies, and investors—enhances theoretical discourse by illuminating diverse institutional roles and surfacing structural constraints that inhibit market activation (Bongini et al., 2022; Lambert et al., 2022).

On the practical side, the findings yield actionable insights tailored to the strategic concerns of each stakeholder group. Platform operators are encouraged to pursue product diversification by collaborating with custody service providers and adapting to evolving regulatory conditions, thereby enhancing product-market fit and investor appeal (Banerjee et al., 2024; Kreppmeier et al., 2023). Regulatory authorities are advised to adopt a facilitative stance—balancing prudential oversight with innovation support—by implementing tiered licensing schemes, regulatory sandboxes, and experimental product trials (Financial Services Commission, 2019a; Financial Services Commission, 2019b). For investors, the study highlights the need for active engagement in platform governance, with a particular emphasis on demanding transparency, broader access to asset classes, and clear, standardized disclosures to mitigate risks associated with asymmetry and illiquidity (Ante & Fiedler, 2020; Lambert et al., 2022).

CONCLUSION

The rise of STOs marks a significant evolution in global capital markets, providing a regulated and transparent alternative to the previously speculative and largely unregulated ICO model (Ante & Fiedler, 2020; Mendelson, 2019). By enabling the tokenization of RWAs, STOs hold the potential to bridge the gap between traditional finance and blockchain innovation (Banerjee et al., 2024;

Cunningham et al., 2024). However, as a nascent market, the STO ecosystem faces substantial structural and institutional challenges that require attention for sustainable growth and investor inclusivity (Lambert et al., 2022; Park et al., 2024).

This study aimed to uncover the underlying dynamics of the STO ecosystem and pinpoint key impediments to its development. Through in-depth interviews with 35 stakeholders—including platform operators, securities firms, regulators, and investors—and employing a CLD methodology grounded in systems thinking, the research mapped complex interdependencies affecting product innovation, market liquidity, investor protection, and regulatory engagement (Ammirato et al., 2022; Kim et al., 2021). The findings highlight critical priorities for activating a resilient STO market, such as developing competitive products, establishing trustworthy secondary trading channels, institutionalizing robust investor protection, and mitigating risks from incomplete sales and regulatory uncertainty (Bongini et al., 2022; Kreppmeier et al., 2023). These insights led to stakeholder-specific recommendations for coordinated market development and underscored the necessity of international benchmarking and adaptive policymaking for market integrity (European Union, 2023; Financial Services Commission, 2019a).

COMPETING INTERESTS

The authors of this publication declare there are no competing interests.

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