



# The role of digital pawn and bullion markets in strengthening financial inclusion

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## ABSTRACT

**Background:** Financial inclusion in Indonesia continues to face structural barriers, particularly among informal households and micro-enterprises that remain underserved by conventional banking systems. Although financial technology has expanded access to digital finance, unsecured digital lending has also generated concerns regarding over-indebtedness and systemic vulnerability. Digital gold pawn and bullion services offer an alternative inclusion model based on real-asset collateral. **Methods:** This study employs an integrated mixed-method approach combining descriptive quantitative analysis of secondary data from 2018–2024 with qualitative examination of financial regulations and governance frameworks related to digital gold-based finance. **Findings:** The findings indicate significant growth in digital gold pawn users, transaction values, and bullion accounts, particularly among unbanked populations and micro-enterprises. Gold-backed financing demonstrates lower default risk and more stable performance than unsecured digital credit due to the stabilizing role of tangible collateral. Digital integration has expanded geographic outreach and improved transaction efficiency, although regulatory fragmentation and uneven consumer protection remain important challenges. **Conclusion:** Digital gold-based finance can strengthen financial inclusion without undermining systemic resilience when technological scalability is structurally aligned with real-asset discipline and harmonized oversight. **Novelty/Originality of this article:** The study advances a hybrid financial inclusion framework that connects informal asset ownership with formal financial systems, and empirically demonstrates how asset-backed digital intermediation reshapes risk allocation, access dynamics, and stability outcomes within a developing digital economy.

**KEYWORDS:** asset-backed finance; digital finance; financial inclusion; gold-based services; non-bank institutions.

## 1. Introduction

Financial inclusion has long been recognized as a critical foundation for economic stability and sustainable growth, particularly in developing economies such as Indonesia, where a persistent dualistic economic structure prevails. While the formal sector continues to undergo rapid modernization and digital transformation, a substantial proportion of the population remains economically active within the informal sector, characterized by limited access to formal financial services (Erumban, 2024). This disparity does not merely reflect the absence of financial institutions, but rather exposes structural limitations in the design of the financial system itself, specifically its inability to accommodate the socio-economic

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realities of low-income households and micro, small, and medium enterprises (Meniago, 2025). Policy initiatives aimed at advancing financial inclusion have predominantly relied on the expansion of banking networks and conventional financial products, yet this approach remains largely institution-centered. In practice, formal banking continues to impose requirements such as legally recognized collateral, documented income streams, established credit histories, and relatively high financial literacy (Trotta et al., 2026). These conditions systematically exclude micro-entrepreneurs and vulnerable households whose economic activities are productive but informal and poorly documented. This reality underscores that financial exclusion in Indonesia is not primarily a matter of physical access, but one of instrument misalignment, where prevailing financial products fail to correspond with the asset profiles, income volatility, and risk-bearing capacities of informal economic actors (OECD, 2024).

Within this structural gap, gold occupies a distinctive and strategically embedded position in Indonesia's socio-economic landscape. Beyond its status as a commodity, gold functions as a socially legitimized economic asset and a widely trusted store of value across income groups (Martínez Raya et al., 2025). Its relative price stability, high liquidity, divisibility, and broad acceptability enable gold to serve as a financial buffer for households facing income uncertainty. In periods of economic stress, gold is frequently mobilized as an adaptive household strategy to preserve purchasing power and manage risk, reinforcing its role as both a savings instrument and a contingent source of liquidity (Hornuf et al., 2025). The use of gold as collateral through pawning practices has therefore emerged as a more inclusive financing mechanism than conventional bank credit. Gold pawning enables the conversion of real assets into liquidity without complex administrative requirements or dependence on formal credit histories (Almgrashi, 2025). From an institutional perspective, this mechanism illustrates how non-bank financial institutions can function as intermediaries linking informal asset ownership with the broader financial system. As such, gold pawning is relevant not merely as a microfinance tool, but as an integral component of the national financial inclusion architecture.

A significant transformation has occurred with the integration of digital technologies into gold pawning and bullion trading. Digitalization has reconfigured valuation, record-keeping, transaction processing, and gold storage into systems that are more efficient, transparent, and standardized (Mandić et al., 2025). Digital pawning and bullion platforms leverage online applications and digital payment infrastructures to reduce transaction costs, minimize geographic and administrative barriers, and scale access to gold-based financial services. This shift extends the role of gold beyond a traditional asset, repositioning it as an active digital financial instrument within Indonesia's evolving fintech-driven inclusion ecosystem. From a financial innovation perspective, the integration of gold into digital financial platforms represents a meaningful expansion of the financial system's depth by non-bank technology-based actors, consistent with broader FinTech-driven inclusion trends documented in Indonesian and global contexts. FinTech innovations—such as digital payments, mobile banking, peer-to-peer lending, and tokenized assets—have been empirically shown to lower barriers to financial access for underserved populations by reducing transaction costs and geographic constraints (ASEAN+3 Macroeconomic, 2024), with over 366 FinTech firms operating across financial sectors in Indonesia by 2023, including those offering digital gold products that extend beyond traditional banking services and reach previously unbanked groups (Masrur et al., 2025). This expansion enriches the array of available financial instruments, enabling households and micro-enterprises to mobilize previously illiquid real assets like gold into saving and borrowing mechanisms that enhance economic agency. Empirical evidence from digital gold ecosystems, including bullion platforms that integrate blockchain or digital custody systems, suggests that these innovations combine the *hedging* properties of gold with the usability of digital finance, encouraging participation from lower-income segments, even as regulatory and literacy challenges remain (Maouchi et al., 2024). In this framework, gold functions not merely as an individual collateral, but as a systemic stabilizer rooted in real-asset value, aligning with broader findings that digital financial inclusion can contribute to

economic resilience when supported by coherent governance and consumer safeguards (Haile et al., 2025).

In the Indonesian context, these dynamics have become increasingly salient given the high prevalence of household gold ownership, the substantial contribution of micro, small, and medium enterprises to the national economy, and the rapid acceleration of digital financial service adoption. Digital gold pawning and digital bullion markets have expanded not merely as outcomes of technological innovation, but as societal adaptations to the structural constraints of the conventional financial system (Masrur et al., 2025). The interaction among widespread asset ownership, informal economic activity, and digital platforms has given rise to a non-bank financial ecosystem with significant implications for the distribution of financial access and the resilience of the broader economic system.

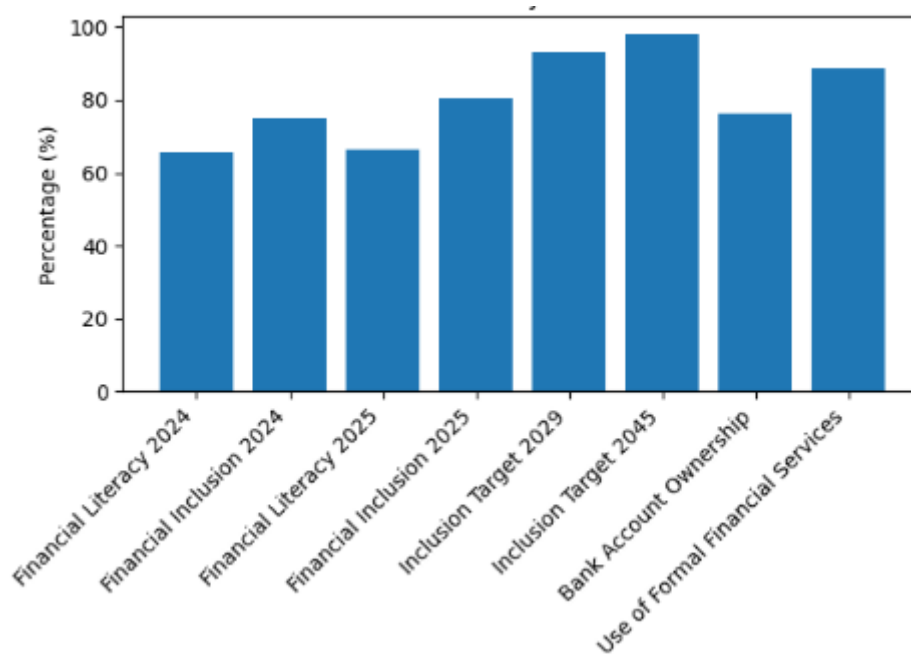


Fig. 1. Structural gap between financial inclusion expansion and financial literacy improvement in Indonesia, highlighting the systemic risk of access-led inclusion without asset-backed discipline. Adapted from Otoritas Jasa Keuangan (2024), Benyamin (2025), and Rustan (2025).

The convergence of widespread household gold ownership, the dominant role of micro, small, and medium enterprises in economic activity, and the rapid diffusion of digital financial platforms has reshaped the contours of non-bank finance (Arfah et al., 2024). Digital gold pawning and bullion platforms have not emerged simply as technological extensions of traditional services, but as functionally differentiated mechanisms that respond to persistent mismatches between conventional financial products and the asset structures of low-income households and micro-entrepreneurs. While formal banking continues to rely on standardized collateral, credit histories, and institutional documentation, these digital gold-based services mobilize assets that are already embedded in social and economic practices, thereby activating latent value that previously circulated outside the formal system.

At the same time, the digitalization of gold-based finance introduces a qualitatively new configuration of financial intermediation. Automated valuation, real-time transaction recording, fractional ownership, and integration with digital payment infrastructures have transformed gold from a passive store of value into a scalable, liquid, and continuously transactable financial instrument. This shift alters not only access patterns but also the risk distribution within the financial ecosystem, as asset-backed digital services expand rapidly beyond traditional supervisory boundaries. Consequently, digital gold pawning and bullion markets occupy a strategic position within Indonesia's evolving financial architecture,

simultaneously broadening participation and redefining the role of real assets in sustaining economic resilience amid deepening financial digitalization.

Despite the growing literature on financial technology and digital financial inclusion, limited attention has been directed toward asset-backed digital finance as a mechanism capable of balancing financial accessibility and systemic stability simultaneously. Existing studies predominantly examine unsecured digital lending, mobile payments, or peer-to-peer financing, while the role of digital gold-based intermediation remains underexplored, particularly in emerging economies characterized by large informal sectors and high household gold ownership. This study addresses that gap by examining how digital pawn and bullion markets contribute to financial inclusion while influencing economic stability in Indonesia. The analysis is directed toward examining three interrelated dimensions within digital gold-based financial services. First, it investigates the extent to which digital gold platforms broaden financial inclusion by expanding access to financial services among underserved and financially marginalized communities. Second, the study explores the role of gold collateral in influencing patterns of risk distribution, financial security, and economic resilience within digital financial transactions. Third, the analysis evaluates how existing regulatory frameworks, governance mechanisms, and institutional arrangements affect the long-term sustainability, stability, and credibility of digital gold ecosystems. The study contributes theoretically by introducing an asset-based digital inclusion framework that positions real-asset collateral as a stabilizing mechanism within technology-driven financial intermediation. Empirically, the study provides evidence from Indonesia's rapidly expanding digital gold market during the 2018–2024 period.

## 2. Methods

### 2.1 Research design

The analytical strategy adopts an integrated mixed-method framework that combines descriptive and comparative quantitative analysis with policy-oriented qualitative inquiry (Ahmed et al., 2024). This design is deliberately structured to capture both observable market dynamics and the institutional conditions shaping digital gold-based financial services. Quantitative analysis serves as the primary analytical backbone, mapping the empirical evolution of digital gold pawning and bullion platforms, while qualitative analysis functions as an interpretive layer that situates these dynamics within regulatory and governance arrangements. This integration allows the analysis to move beyond surface-level growth indicators and examine how non-bank digital finance operates as a structurally embedded component of the financial system.

### 2.2 Data sources and observation period

The quantitative component relies exclusively on secondary data sourced from nationally recognized institutions and official disclosures, including Otoritas Jasa Keuangan, Bank Indonesia, Badan Pusat Statistik, and publicly available reports from digital pawnshops and bullion platforms. The observation window spans 2018 to 2024, capturing the transition from early digital experimentation to accelerated adoption and market consolidation.

### 2.3 Quantitative analysis

Variables are organized into two analytical clusters. The first captures financial inclusion through indicators such as user growth, transaction volumes, gold-based financing values, and participation of micro and non-bankable segments (Otoritas Jasa Keuangan, 2024). The second reflects micro- and meso-level economic stability, proxied by trends in asset-backed non-bank financing, portfolio composition, and shifts from informal

to digitally intermediated financing channels. Temporal comparison is applied to identify growth trajectories, structural consistency, and shifts in service composition.

#### 2.4 Qualitative analysis and policy review

Qualitative analysis is conducted through systematic review of policy and regulatory documents governing pawning activities, bullion trading, and digital financial services. This includes regulatory frameworks issued by OJK, digital payment and financial infrastructure policies from Bank Indonesia, and national strategies on financial inclusion. A thematic coding approach is applied to assess alignment between empirical market expansion and governance capacity, focusing on consumer protection, risk management, institutional integration of non-bank actors, and the role of real assets within digital finance.

#### 2.5 Research context and location

Indonesia is selected as the empirical setting due to its high household gold ownership, the structural prominence of MSMEs, and rapid digital financial adoption, while the 2018–2024 period is analytically justified as a phase reflecting systemic transition, acceleration, and early stabilization of gold-based non-bank digital finance.



Fig. 2. Research location

#### 2.6 Validity and research limitations

To strengthen analytical validity, data triangulation was applied by comparing information across regulatory reports, institutional publications, and industry performance disclosures. The study does not aim to establish causal relationships through econometric modeling; instead, it seeks to identify structural patterns linking asset-backed digital finance, financial accessibility, and stability dynamics within Indonesia's evolving financial ecosystem. Several limitations should be acknowledged. First, the study relies primarily on secondary data, which limits direct observation of user behavior at the household level. Second, differences in reporting standards across digital financial platforms may affect data consistency. Third, the rapidly evolving nature of digital finance regulation means that some institutional developments may continue to change beyond the observation period.

### 3. Results and Discussion

#### 3.1 Digital gold finance, inclusion, and stability dynamics

The findings indicate that digital gold-based finance operates through a fundamentally different risk structure than unsecured fintech lending. Rather than relying primarily on

predictive algorithms and behavioral scoring, digital pawn and bullion services are anchored in tangible collateral with relatively stable market value. This distinction is theoretically important because it alters the relationship between financial accessibility and systemic exposure. Within conventional digital lending ecosystems, rapid inclusion frequently increases vulnerability by expanding unsecured debt among financially fragile users. The Indonesian digital gold ecosystem demonstrates a contrasting mechanism in which access expansion remains partially constrained by real-asset ownership. Gold collateral functions as a stabilizing instrument that moderates excessive leverage while preserving liquidity access for households and micro-enterprises.

Table 1. Empirical findings on digital gold pawn and digital bullion services in Indonesia (2018–2024)

Empirical indicator	Key findings (Secondary data)	Implications for financial inclusion	Implications for economic stability
Growth of digital gold pawn users	Number of digital pawn service users has increased significantly since 2019, with post-pandemic acceleration (2021–2024), particularly in urban and peri-urban areas	Lowers entry barriers for unbanked and underbanked populations through the use of existing household assets	Asset-backed expansion constrains high-risk credit growth
Digital gold pawn transaction volume	Annual transaction values show a sustained upward trend and greater stability compared to unsecured digital consumer credit	Provides rapid short-term liquidity access for micro-UMKMs and vulnerable households	Reduces extreme default risk due to relatively stable collateral values
Geographic outreach of digital services	Digital pawn and bullion services reach regions with limited physical pawnshop presence	Narrows regional disparities in access to financial services	Geographic diversification mitigates concentration risk
Share of MSMEs among pawn users	Micro-enterprises dominate digital gold pawn usage for short-term working capital	Supports small business continuity without reliance on informal lending	Asset-based financing limits excessive MSME leverage
Growth of digital bullion accounts	Digital bullion accounts expand alongside increased adoption of small-denomination gold investment	Encourages gradual financial participation among low-income groups	Household-level accumulation of real assets strengthens balance sheets
Value of digital gold savings	Digital gold holdings show an upward trend with lower volatility than other digital financial assets	Reinforces asset-based saving behavior rooted in trust	Functions as a micro-level value buffer
Integration with digital payment systems	Disbursement and repayment are integrated with e-wallets and mobile banking	Promotes sustained use of formal financial services	Enhances transparency of fund flows
Regulatory gaps in non-bank digital finance	Regulatory and supervisory frameworks remain partially unharmonized across platforms	Heightened consumer protection risks for low-literacy users	Potential accumulation of exposures outside conventional oversight

These patterns support the argument that financial inclusion and financial stability should not necessarily be interpreted as competing policy objectives. Their relationship depends on the institutional structure of financial intermediation, the quality of governance, and the nature of underlying assets supporting financial transactions. Empirical evidence indicates that the use of gold as collateral within non-bank digital financial services has expanded in a consistent and measurable manner alongside the accelerated adoption of digital gold pawn and digital bullion platforms in Indonesia. A synthesis of secondary data

drawn from the Financial Services Authority, Bank Indonesia, and performance reports of service providers over the 2018–2024 period reveals a clear increase in the number of active accounts, transaction values and frequencies, as well as the geographic reach of gold-based services. This growth is not episodic but reflects a sustained trajectory that parallels the maturation of the non-bank digital financial ecosystem. At the segment level, the most pronounced acceleration is observed among unbanked households and micro and small enterprises, groups that typically hold gold as a real asset yet face structural constraints in meeting conventional banking requirements. These findings underscore the role of gold as a critical lever for lowering entry barriers to formal financial participation, while simultaneously redirecting short-term liquidity needs away from informal channels toward more standardized and monitored digital mechanisms.

The empirical findings summarized in Table 1 indicate that the evolution of digital gold pawn and digital bullion services in Indonesia between 2018 and 2024 reflects a structurally distinct pathway in which financial inclusion and economic stability can develop in a complementary manner. Unlike unsecured digital credit models that often rely on behavioral scoring and carry higher default risks, gold based digital finance is anchored in a tangible asset with widely recognized value. This characteristic shapes both user behavior and institutional risk exposure, creating a system in which access expansion is moderated by collateral discipline. One of the most visible trends is the rapid growth in digital gold pawn users, particularly following the economic disruptions associated with the pandemic period. The number of users has increased significantly since 2019, with accelerated adoption between 2021 and 2024, especially in urban and peri urban areas. This growth reflects the ability of digital platforms to lower entry barriers for individuals who lack access to formal banking services. By allowing households to utilize existing gold holdings as collateral, platforms such as Pegadaian enable participation without requiring formal credit histories or extensive documentation (Astuti et al., 2026). From the perspective of financial inclusion, this represents a meaningful shift, as it integrates previously excluded populations into formal financial channels. At the same time, because lending remains asset backed, the expansion of credit is inherently constrained by the availability of collateral, thereby limiting the emergence of high risk lending practices that could destabilize the system (Naili & Lahrichi, 2022).

A similar pattern is observed in the growth of digital gold pawn transaction volumes, which have shown a sustained upward trend alongside relatively stable performance compared to unsecured digital consumer credit. This stability is significant, as it suggests that gold based transactions provide a reliable source of short term liquidity for micro enterprises and vulnerable households. These groups often face cash flow volatility and limited access to formal financing, making rapid liquidity provision essential for maintaining economic activity. The use of gold as collateral reduces extreme default risk, as its value tends to remain relatively stable over time. Consequently, even in periods of economic stress, the likelihood of systemic credit deterioration is lower than in unsecured lending environments. This reinforces the notion that asset backed financial services can simultaneously support inclusion and stability when properly structured.

The geographic outreach of digital gold services further illustrates their inclusive potential. Digital platforms have expanded access to regions where physical pawnshop infrastructure is limited or absent, thereby narrowing regional disparities in financial service availability. This expansion is particularly relevant in a country characterized by significant geographic fragmentation, where traditional financial institutions may face high operational costs in serving remote areas. By leveraging digital channels, providers can extend their reach without requiring physical presence, thereby increasing efficiency and inclusivity. From a stability perspective, this geographic diversification also reduces concentration risk. When financial activity is distributed across multiple regions, localized shocks are less likely to propagate through the entire system, enhancing overall resilience (Essuman et al., 2023).

Another important dimension is the high share of micro, small, and medium enterprises among digital gold pawn users. These enterprises frequently rely on short term

financing to sustain operations, manage inventory, and respond to demand fluctuations. Digital gold pawn services provide a viable alternative to informal lending, which often involves high interest rates and limited consumer protection. By enabling MSMEs to access working capital through asset based mechanisms, these services support business continuity while avoiding excessive leverage. Since borrowing capacity is tied to the value of pledged gold, the risk of over indebtedness is inherently constrained. This contributes to a more stable microeconomic foundation, which in turn supports broader economic stability.

The expansion of digital bullion accounts represents another channel through which inclusion is being deepened. The increasing adoption of small denomination gold investment products allows individuals, particularly those in lower income segments, to gradually accumulate assets in a form that is both accessible and trusted. Digital platforms facilitate fractional ownership, enabling users to purchase gold in small increments that would not be feasible in traditional markets. This encourages a culture of saving and long term financial planning. From a stability perspective, the accumulation of real assets at the household level strengthens balance sheets and provides a buffer against economic shocks. Unlike purely financial assets that may be subject to higher volatility, gold retains intrinsic value, making it a reliable store of wealth. Consistent with this trend, the overall value of digital gold savings has shown steady growth with relatively low volatility compared to other digital financial instruments. This pattern reinforces asset based saving behavior and reflects the enduring trust in gold as a financial instrument. For households, digital gold functions as a micro level value buffer that can be mobilized in times of need. This dual role as both a savings instrument and a source of liquidity enhances financial resilience. At the aggregate level, widespread adoption of such instruments contributes to a more stable financial environment by reducing reliance on high risk credit products.

The integration of digital gold services with payment systems, including electronic wallets and mobile banking platforms, further amplifies their impact. This integration streamlines the processes of disbursement and repayment, making financial transactions more efficient and transparent. Users are more likely to engage consistently with formal financial systems when services are accessible through familiar digital interfaces. Increased transparency in fund flows also supports regulatory oversight and reduces the likelihood of informal or opaque financial activities. In this sense, technological integration not only enhances user experience but also contributes to systemic stability by improving traceability and accountability.

Despite these positive developments, the presence of regulatory gaps in non bank digital finance remains a critical concern. Supervisory frameworks are not yet fully harmonized across platforms, creating inconsistencies in standards and oversight. This situation poses heightened risks for consumers, particularly those with limited financial literacy who may not fully understand the terms and conditions of digital financial products. Inadequate regulation can lead to issues related to mismanagement, fraud, or insufficient safeguards for customer assets. From a systemic perspective, the accumulation of financial exposures outside conventional oversight mechanisms introduces potential vulnerabilities that could undermine stability if left unaddressed.

Table 2. Development of digital gold pawn services in Indonesia

Indicator	2018	2020	2022	2024	Trend interpretation
Digital gold pawn users (million accounts)	0.9	1.6	2.4	3.1	Strong upward growth
Digital gold pawn transaction value (IDR trillion/year)	38	58	82	110	Stable and sustained increase
Average loan size per transaction (IDR million)	6.2	6.8	7.4	8.1	Moderate growth
Non-performing loan ratio (NPL / NPL-equivalent, %)	1.4	1.6	1.8	1.9	Persistently low

These empirical findings suggest that the role of gold as collateral in digital financial services extends beyond facilitating access to finance. It also establishes a form of discipline that shapes borrowing behavior and risk management practices (Luthfi & Hati, 2025). The observed patterns demonstrate that financial inclusion and economic stability need not be viewed as inherently conflicting objectives. Instead, they can evolve in tandem when financial innovations are grounded in assets with intrinsic value and supported by coherent governance frameworks. The Indonesian experience illustrates that digital transformation, when aligned with asset based principles, can create a financial ecosystem that is both inclusive and resilient.

Quantitatively, the number of active accounts in digital gold pawn and digital bullion services exhibits a steady year-on-year increase, closely aligned with the expansion of internet penetration and the diffusion of digital payment systems. Transaction values in digital gold pawning have also grown at a faster pace than those of conventional pawn services, particularly in the post-pandemic period, when short-term liquidity needs intensified while access to formal bank credit remained constrained. This pattern signals a structural shift in user preferences toward financing mechanisms that are more flexible, faster to access, and anchored in assets already owned by households.

From a financial inclusion perspective, these findings demonstrate that gold collateral functions effectively in lowering entry barriers to the formal financial system. Unlike bank lending, which typically requires formal documentation and an established credit history, digital gold pawn services enable the conversion of real assets into liquidity through simplified procedures and shorter disbursement times (Azmi & Dharma, 2023). This dynamic is reflected in the rising share of first-time users who were previously absent from formal financial institutions. Among micro-enterprises, household gold is frequently leveraged as an alternative source of short-term working capital, particularly in small-scale trade and home-based businesses, underscoring the role of gold-based digital services as a pragmatic bridge between informal economic activity and formal financial channels.

Table 3. Characteristics of digital gold pawn users

Characteristic	Percentage (%)
Unbanked (no active bank credit)	46
Underbanked (bank account with limited credit access)	34
Micro and ultra-micro MSMEs	58
Non-MSME households	42
Users outside metropolitan areas	49

The transformation of gold from a traditional asset into a digital financial instrument is further reflected in the expansion of the digital bullion market (Jameaba, 2022). These services not only enable incremental gold ownership through small-denomination purchases, but also integrate storage, ownership recording, and liquidation functions within a single digital system. Accumulation patterns among lower- and middle-income households indicate that digital bullion serves as a gradual entry point into more formal financial participation, while simultaneously functioning as a risk management tool anchored in real assets.

Table 4. Key Indicators of digital bullion market development in Indonesia (2019–2024)

Indicator	2019	2021	2023	2024
Digital bullion accounts (million)	0.4	1.1	2.0	2.6
Digital gold savings (tons)	12	28	46	60
Average gold holding per account (grams)	30	26	23	22
Minimum purchase amount (IDR thousand)	100	50	20	10

From a financial stability perspective, the use of gold as collateral exhibits relatively higher resilience compared to expectation-driven instruments or volatile financial assets. Gold prices tend to remain stable over the medium term, thereby reducing the likelihood of sharp collateral value deterioration. This characteristic provides a buffer against default

risk at the individual level and limits risk exposure for service providers. In this context, gold operates as a natural discipline mechanism, linking the expansion of financing to the availability of underlying real value.

The analysis also identifies potential structural risks arising from the rapid expansion of gold-based digital financial services. Regulatory fragmentation across the banking sector, non-bank financial institutions, and technology platforms creates supervisory gray areas, particularly with respect to digital gold ownership records, physical storage arrangements, and consumer protection standards (Muvunyi & Batóg, 2025). Variations in governance practices among service providers may generate information asymmetries and uneven levels of user protection, disproportionately affecting groups with limited financial literacy. These findings indicate that the contribution of digital gold pawn services and digital bullion markets to financial inclusion cannot be separated from their implications for financial system stability. Service expansion that is not accompanied by regulatory harmonization and effective oversight risks shifting vulnerabilities from the individual level to the institutional level. Conversely, when embedded within a coherent and consistent governance framework, gold-based digital services have the potential to strengthen financial system resilience by broadening participation without amplifying speculative exposure.

Table 5. Empirical evidence on inclusion–stability trade-offs in digital gold pawn and bullion markets in Indonesia (2019–2024)

Dimension	Empirical indicator	Quantitative evidence	Data Source	Implication for financial inclusion	Implication for financial stability
Market expansion	Active users	Avg. annual growth 20–25%	OJK IKD Statistics; Pegadaian Reports	Rapid access for unbanked & micro-entrepreneurs	Growth outpaces supervisory capacity
Transaction scale	Gold-backed transaction value	CAGR 18–22%	OJK; Industry Performance Reports	Increased short-term liquidity access	Higher exposure concentration
Regulatory coverage	Platform supervision status	~40% providers outside direct OJK licensing	OJK Regulatory Mapping	Entry barriers reduced via non-bank platforms	Regulatory gaps and oversight asymmetry
Collateral discipline	Loan-to-Value (LTV) ratio	70–85% (digital) vs. 60–70% (conventional)	Pegadaian; Industry Data	Lower entry threshold for borrowers	Thinner collateral buffers
Consumer protection	Fintech-related complaints	17–21% linked to gold-based services	OJK Consumer Protection Reports	First-time users vulnerable	Reputational and trust risks
Custody standards	Physical gold storage	No unified national custody standard	OJK Policy Reviews	Lower operational costs	Settlement and operational risk
Ownership registry	Digital gold records	Absence of single national registry	BI Payment System Blueprint	Seamless cross-platform transactions	Risk of asset mismatch
Financial literacy	National literacy index	49.68% (2022)	OJK–BPS Survey	Quantitative inclusion rises	Information asymmetry persists
Market concentration	Top 5 providers' share	>65% of total transactions	OJK Market Reports	Economies of scale	Potential systemic spillovers
Asset characteristics	Gold price volatility	Relatively stable medium-term	BI; World Gold Council	Predictable collateral value	Natural credit risk buffer

The expansion of digital gold pawn and bullion markets in Indonesia between 2019 and 2024 presents a distinctive empirical setting in which the relationship between financial inclusion and financial stability can be observed with unusual clarity. Unlike unsecured digital lending or conventional banking intermediation, this segment of the financial system is fundamentally anchored in a tangible asset with longstanding monetary and cultural significance. Gold, as both a store of value and a collateral instrument, has historically played a stabilizing role in times of economic uncertainty. The digital transformation of gold based financial services therefore introduces a hybrid model that combines traditional asset backed lending principles with the scalability and accessibility of financial technology. This synthesis generates both opportunities and tensions, particularly in relation to the inclusion stability trade off.

Empirical evidence drawn from regulatory statistics and industry reports indicates that market expansion has been substantial, with active user growth averaging between twenty and twenty five percent annually over the observed period. This rapid increase reflects the success of digital platforms in lowering barriers to entry for unbanked populations and micro entrepreneurs who have historically been excluded from formal financial systems due to documentation requirements, lack of credit history, and limited access to banking infrastructure. By enabling users to pledge gold digitally and obtain liquidity without extensive procedural requirements, these platforms effectively democratize access to short term credit. However, the pace of expansion also raises concerns regarding supervisory capacity. Regulatory institutions may struggle to match the speed at which new users and transactions are incorporated into the system, thereby creating potential blind spots in oversight and risk monitoring (International Financial Federation, 2020).

The scale of transactions further reinforces this dual dynamic. Gold backed transaction values have grown at a compound annual rate ranging from eighteen to twenty two percent, indicating a deepening reliance on gold as a liquidity generating instrument. From the perspective of financial inclusion, this trend suggests that households and small enterprises are increasingly able to access immediate funds by leveraging existing assets rather than relying on informal credit markets. This shift enhances short term financial resilience and reduces dependence on high cost borrowing channels. Nevertheless, the concentration of financial activity within a specific asset class introduces exposure risks. As transaction volumes increase, the financial system becomes more sensitive to fluctuations in gold prices and market liquidity conditions, even if such fluctuations remain relatively moderate compared to other asset classes (Al Janabi et al., 2019).

A critical dimension shaping the inclusion stability nexus is the extent of regulatory coverage. Approximately forty percent of digital gold service providers operate outside direct licensing frameworks, according to regulatory mapping exercises. This partial oversight structure reflects the evolving nature of financial technology, where innovation often outpaces the development of comprehensive regulatory regimes. On one hand, the presence of non bank platforms reduces entry barriers and fosters competition, thereby enhancing access for underserved populations. On the other hand, regulatory gaps create asymmetries in supervision and risk management practices. Institutions operating outside formal licensing frameworks may not be subject to the same prudential standards, reporting requirements, or consumer protection obligations as regulated entities, thereby increasing systemic vulnerability (Olatinsu, 2023).

Collateral discipline constitutes another important factor in understanding the trade off. Digital gold pawn platforms typically apply loan to value ratios ranging from seventy to eighty five percent, compared to sixty to seventy percent in conventional pawn arrangements. This higher ratio effectively lowers the threshold for borrowing, allowing users to extract greater liquidity from the same amount of collateral. While this feature enhances accessibility and supports inclusion, it simultaneously reduces the buffer available to absorb price fluctuations or liquidation costs. In the event of adverse market movements, thinner collateral margins may increase the likelihood of losses for both

borrowers and providers (Eltweri et al., 2024). This dynamic illustrates how technological efficiency can amplify both the benefits and risks associated with asset backed lending.

Consumer protection emerges as a particularly salient issue in this context. Data from regulatory reports indicate that between seventeen and twenty one percent of fintech related complaints are associated with gold based services. This relatively high proportion reflects the vulnerability of first time users who may lack familiarity with digital financial products, contractual terms, and risk implications. While digital platforms enhance accessibility, they also introduce complexities related to pricing transparency, fee structures, and dispute resolution mechanisms. Inadequate consumer protection frameworks can erode trust in the financial system and undermine the long term sustainability of inclusion gains (Dom et al., 2022). Trust, once compromised, is difficult to restore and may have broader reputational implications for the financial sector as a whole.

Operational and custodial considerations further complicate the stability landscape. The absence of a unified national standard for physical gold storage creates variability in custody practices across providers (Alimukhamedov, 2024). While some institutions maintain robust storage and auditing systems, others may operate with less stringent safeguards. This heterogeneity introduces settlement and operational risks, particularly in scenarios involving large scale redemptions or disputes over asset ownership. From an inclusion perspective, the lack of standardized custody requirements may reduce operational costs and enable smaller providers to enter the market. However, from a stability standpoint, it raises concerns regarding the integrity and reliability of the underlying asset base.

The issue of ownership registry is closely related to custodial risk. The absence of a single national registry for digital gold holdings means that ownership records are maintained independently by individual platforms. While this decentralized approach facilitates seamless cross platform transactions and enhances user convenience, it also creates the potential for asset mismatches and double counting. In extreme cases, discrepancies between recorded and actual gold holdings could undermine confidence in the system and trigger liquidity pressures. Establishing an integrated registry framework would therefore represent a critical step toward reconciling the objectives of inclusion and stability (Jameaba, 2022).

Financial literacy remains a foundational determinant of how effectively users can navigate this evolving landscape. With a national financial literacy index of approximately forty nine point sixty eight percent, a significant portion of the population may lack the knowledge required to make informed decisions regarding digital gold products (Masrur et al., 2025). While quantitative indicators of inclusion, such as account ownership and transaction frequency, continue to improve, qualitative aspects related to user understanding and risk awareness lag behind. This gap perpetuates information asymmetry between providers and users, increasing the likelihood of suboptimal financial behavior and potential exploitation. Enhancing financial literacy is therefore essential for ensuring that inclusion translates into meaningful economic empowerment rather than mere participation (Otoritas Jasa Keuangan, 2024).

Market concentration adds another layer of complexity to the inclusion stability trade off. The top five providers account for more than sixty five percent of total transactions, indicating a relatively concentrated market structure (Azmi & Dharma, 2023). On one hand, this concentration enables economies of scale, technological investment, and operational efficiency, which can improve service quality and reduce costs for users. On the other hand, it creates the potential for systemic spillovers in the event of institutional distress. The failure or disruption of a major provider could have cascading effects across the market, affecting a large number of users and transactions simultaneously. This concentration risk underscores the importance of robust oversight and contingency planning within the digital gold ecosystem (Naili & Lahrichi, 2022).

Despite these challenges, the intrinsic characteristics of gold provide a degree of stability that distinguishes this market from other segments of digital finance. Gold prices exhibit relatively stable behavior over the medium term, supported by global demand

dynamics and its role as a safe haven asset. This stability contributes to predictable collateral valuation and reduces the likelihood of abrupt credit deterioration. In this sense, gold functions as a natural buffer against systemic risk, mitigating some of the vulnerabilities associated with rapid digital expansion. This buffer is not absolute and must be complemented by sound governance and risk management practices (Mandić et al., 2025).

These empirical observations suggest that digital gold-based finance in Indonesia represents neither a straightforward extension of traditional banking nor a replication of unsecured fintech lending models (Benyamin, 2025). Instead, it constitutes a hybrid mechanism in which technological scalability interacts with asset based discipline to shape financial outcomes. The inclusion stability relationship in this context is therefore contingent rather than deterministic. Expanding access to financial services through digital gold platforms can contribute to economic resilience and empowerment, particularly for underserved populations (ASEAN+3 Macroeconomic, 2024). However, these benefits are conditional upon the alignment of technological innovation with regulatory coherence, operational integrity, and user capability. In conclusion, the Indonesian experience highlights the importance of adopting a holistic approach to financial sector development. Policymakers must balance the objectives of inclusion and stability by ensuring that regulatory frameworks evolve in tandem with technological advancements. This includes extending supervisory coverage to encompass emerging platforms, standardizing custodial practices, establishing integrated ownership registries, and strengthening consumer protection mechanisms. At the same time, efforts to enhance financial literacy must be intensified to enable users to engage with digital financial products in a responsible and informed manner. Only through such coordinated measures can the potential of digital gold based finance be fully realized without compromising the stability of the broader financial system.

#### 4. Conclusions

This study situates digital gold pawn services and digital bullion markets within Indonesia's broader challenge of expanding financial inclusion while safeguarding economic stability in a highly dualistic economy. Using an integrated mixed-method approach that combines descriptive and comparative analysis of secondary data from 2018–2024 with a qualitative review of regulatory and policy frameworks, the analysis captures both market dynamics and institutional conditions shaping gold-based non-bank digital finance. The results show a sustained increase in users, transaction values, and geographic outreach of digital gold-based services, with particularly strong uptake among unbanked households and micro enterprises that traditionally rely on informal finance. Gold collateral effectively lowers entry barriers by enabling the conversion of existing household assets into short-term liquidity through simplified digital procedures, while the parallel expansion of digital bullion platforms promotes gradual asset accumulation among lower-income groups. From a stability perspective, the relative price stability and liquidity of gold provide an endogenous discipline mechanism that keeps default rates low and constrains excessive risk-taking compared to unsecured digital credit. However, the rapid expansion of these services within partially fragmented regulatory environments introduces structural vulnerabilities related to supervision, consumer protection, and asset custody. Overall, the findings indicate that digital gold pawn and bullion markets can simultaneously advance financial inclusion and support economic resilience, provided that their growth is embedded within coherent and harmonized governance frameworks. Empirically, the study demonstrates that digital gold-based financial services exhibit lower default tendencies and more stable transactional performance than unsecured digital lending models. The evidence further shows that inclusion outcomes become more sustainable when digital scalability is supported by tangible asset structures and coordinated governance arrangements.

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## **Author Contribution**

H.W.N and Z.U.A jointly contributed to the conceptualization and overall research design of the study. H.W.N led the methodological development, data collection, and primary analytical processes, while Z.U.A provided critical oversight in validating the analytical framework and interpreting the findings. The initial manuscript draft was prepared by H.W.N and Z.U.A conducted substantive review and revision to strengthen the theoretical coherence, methodological rigor, and clarity of argumentation. Both authors contributed to data validation, visualization of results, and refinement of the discussion. Z.U.A supervised the research process and ensured academic quality control, while H.W.N managed project administration. Both authors read, critically evaluated, and approved the final version of the manuscript for submission.

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## **Ethical Review Board Statement**

This study did not involve direct participation of human subjects and therefore did not require approval from an ethics committee.

## **Informed Consent Statement**

Not available.

## **Data Availability Statement**

The data used in this study are derived from secondary sources that are publicly available and published by official institutions.

## **Conflicts of Interest**

The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

## **Declaration of Generative AI Use**

During the preparation of this work, the authors used ChatGPT to assist in structuring the manuscript and improving academic clarity. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the content of the publication.

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