JSSEW
Journal of Sustainability, Society, and Eco-Welfare
JSSEW 4(1): 141–160
ISSN 3025-1524

Institute for Advanced Science, Social and Sustainable Future
MORALITY BEFORE KNOWLEDGE

The contribution of Pegadaian's gold to public finances: A bibliometric and SEM-PLS analysis

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Received Date: February 12, 2026 Revised Date: June 21, 2026 Accepted Date: July 27, 2026

ABSTRACT

Background: Financial inclusion is a fundamental pillar of global sustainable development, yet achieving universal access remains a challenge in many emerging economies due to a persistent digital divide and structural barriers. While global discourse has shifted toward digital-centric solutions, conventional asset-based instruments like gold pawning which leverage high levels of physical gold ownership remain vital at the grassroots level. This study aims to analyze the strategic contribution of gold pawning to financial inclusion by bridging the gap between global research trends and empirical field realities. **Methods:** Utilizing a mixed-methods exploratory sequential design, the study first employs bibliometric analysis on 208 scientific publications (2015–2025) retrieved via Publish or Perish to map the intellectual structure of the field. This is followed by a quantitative empirical analysis of 101 respondents using structural equation modeling–partial least squares (SEM-PLS) to test the causal relationship between gold pawning and financial inclusion. **Findings:** The bibliometric mapping reveals a dominant global shift toward digital finance and fintech, identifying gold pawning as a "missing link" that is relatively underrepresented in scholarly literature despite its practical usage. The refined empirical model demonstrates that gold pawning exerts a strong positive effect on financial inclusion with a path coefficient of 0.761. The model exhibits substantial predictive power with an R-square (R^2) of 0.512 and an exceptionally large effect size (f^2) of 1.050, indicating that gold pawning is a primary driver for expanding access to the formal financial system. **Conclusion:** These findings confirm that gold pawning serves as a context-sensitive and high-trust "gateway" for the unbanked, minimizing barriers related to digital literacy and documentation; strengthen social welfare at the grassroots level by providing immediate liquidity, enhancing financial resilience, and bridging socioeconomic gaps without the barrier of digital literacy. **Novelty/Originality of this article:** This study contributes to the field of ecosocial well-being by empirically identifying traditional asset-based financing as a crucial link that has long been overlooked in sustainable financial inclusion.

KEYWORDS: bibliometrics; financial access; financial inclusion; gold pawning; SEM-PLS.

1. Introduction

Financial inclusion has emerged as a cornerstone of the global strategic agenda for sustainable economic development and social equity, evolving from a technical banking concern into a fundamental human right that facilitates access to affordable and appropriate financial services for all segments of society. This concept is deeply intertwined with the United Nations Sustainable Development Goals (SDGs), particularly in its capacity to reduce poverty and foster economic resilience (Blasi, 2022). The core philosophy of inclusive finance emphasizes not only the mere availability of financial products but also the ease of

Cite This Article:
Almizri, W., & Akhmad, Y. (2026). The contribution of Pegadaian's gold to public finances: A bibliometric and SEM-PLS analysis. *Journal of Sustainability, Society, and Eco-Welfare*, *4*(1), 141-160. https://doi.org/10.61511/jssew.v4i1.2026.3514

access, affordability, and the effective utilization of formal financial instruments by marginalized populations (Aloulou, 2024). When previously excluded individuals are integrated into the formal financial ecosystem, they gain essential tools to manage economic risks, invest in education, and build tangible assets, which collectively enhance macroeconomic stability (Kamberidou, 2020). However, in many developing nations, achieving universal financial inclusion remains a persistent structural challenge characterized by large "unbanked" populations who are hampered by low income, limited financial literacy, and the often prohibitive administrative requirements of conventional banking institutions (Bamunuarachchi, 2023). These structural barriers frequently force the most vulnerable populations into informal and often exploitative financial channels, such as local moneylenders, making the identification of accessible, fair, and culturally relevant financial instruments a critical priority for sustainable development (Shahzad, 2020).

The current global discourse on financial inclusion is increasingly dominated by a paradigm of digital transformation, where scholarly and policy attention is heavily focused on financial technology (fintech), mobile banking, and artificial intelligence (Zhang, 2022). While these digital platforms offer significant efficiencies and the potential to bypass physical infrastructure gaps in remote areas, this rapid shift has inadvertently highlighted a profound and systemic "digital divide"(Wang, 2021). Many individuals in developing economies particularly those in rural areas or from older generations lack the necessary digital infrastructure, stable internet connectivity, or the requisite digital literacy to navigate complex electronic interfaces (Kass-Hanna, 2022). This digital gap creates a new form of financial exclusion where the "digitally illiterate" are left further behind as traditional branches close in favor of mobile apps. Furthermore, in many traditional and emerging societies, there remains a deep-seated cultural and psychological preference for tangible, physical assets over abstract digital representations of wealth (Lyons, 2021a). For these communities, wealth is not merely a number on a screen but something that can be held, seen, and verified physically. This preference suggests that a purely digital strategy is insufficient and that conventional, real-asset-based financial instruments must be recognized as vital and complementary components of a truly inclusive and pluralistic financial ecosystem (Senyo, 2022).

In this specific context, gold pawning stands out as a unique and strategically significant mechanism for promoting financial inclusion due to its high social legitimacy and its reliance on gold an asset historically perceived as stable, liquid, and a "safe-haven" during periods of economic uncertainty (Xun, 2020). Gold pawning, particularly in the form of Sharia-compliant Ar-Rahnu, offers a practical bridge for the unbanked by providing immediate financing based on physical collateral with simple procedures that do not require complex credit histories or high-tech devices (Ahamed, 2021). It serves not only as a short-term emergency funding source but also as a critical gateway into the formal financial system, allowing individuals to build institutional trust through tangible asset management. In many developing countries, gold is the primary form of household savings thus, a financial system that recognizes and leverages this asset is inherently more inclusive than one that demands traditional paper-based or digital-only proof of wealth (Yuspin, 2020). Despite its widespread practical use at the grassroots level, gold pawning remains significantly underrepresented in contemporary academic literature. Preliminary bibliometric analysis reveals a "digital dominance gap," where global research trends have shifted toward smart technology while largely neglecting the empirical role of real-asset-based instruments like gold pawning in expanding financial access for those not yet ready for a digital-only world (Baas, 2020).

To address these identified gaps, this study employs a novel dual analytical approach that integrates macro-level bibliometric mapping with micro-level empirical validation using Structural Equation Modeling-Partial Least Squares (SEM-PLS) (Ghasemy, 2020). This methodology allows for a comprehensive understanding of how gold pawning is positioned within the global intellectual structure while simultaneously testing its causal impact on financial inclusion in a specific social context. By utilizing visualization tools such as

VOSviewer to map research clusters and overlay trends, the study identifies that while global literature is rapidly moving toward artificial intelligence and fintech, the reality of financial inclusion for many still relies on accessible and trusted conventional instruments (Chatterjee, 2021). This research challenges the prevailing digital-centric narrative by advocating for a more contextual approach, where traditional financial practices are not seen as obsolete relics but as high-impact drivers of modern inclusive finance. It emphasizes that for financial inclusion to be sustainable, it must be culturally resonant and psychologically accessible to the people it serves (Bag, 2021).

The empirical rigor of this study was further strengthened through a comprehensive and necessary refinement of the measurement model to address earlier inadequacies in indicator validity (Macchiavello, 2022). Initial evaluations showed significant measurement problems, with some indicator loadings falling as low as 0.129, which compromised the reliability of the entire model. By removing these problematic indicators and focusing on the most robust items, the study successfully moved from a weak measurement framework to a highly reliable one. The refined model, as demonstrated in recent analytical results, features strong outer loadings ranging from 0.712 to 0.816 for the gold pawning construct and 0.856 to 0.867 for the financial inclusion construct. This ensures that the respondents' perceptions are consistently and accurately represented, providing a solid foundation for the structural analysis. The final structural model yields a significant and much higher Path Coefficient of 0.761, indicating a very strong positive relationship between the utilization of gold pawning services and the level of public financial inclusion.

Furthermore, the model's explanatory power is evidenced by an R-Square (R^2) value of 0.512, which signifies that gold pawning alone accounts for 51.2% of the variation in financial inclusion levels among the studied population. This is a substantial increase from the initial model's 39.9%, confirming that when measured accurately, the contribution of gold pawning is substantively meaningful in driving community engagement with formal financial services. These findings suggest that for many communities, gold pawning represents a "missing link" in the financial ecosystem a solution that minimizes structural barriers such as lack of formal documentation or low digital literacy (Truby, 2020). From a policy perspective, these results underscore the necessity of integrating traditional asset-based instruments into national financial inclusion strategies rather than focusing exclusively on digital innovation (Lee, 2020). By validating the empirical strength of gold pawning through this dual approach, this study advocates for a hybrid financial ecosystem where trusted conventional mechanisms and modern technological advancements coexist to ensure that no segment of the population is left behind in the pursuit of global economic integration (Panos, 2020). This comprehensive analysis ultimately provides a new theoretical framework that views financial inclusion as a multidimensional process that must align with the social, cultural, and economic realities of the community to be truly effective.

2. Methods

2.1 Research design and approach

This research adopts a rigorous mixed-methods approach utilizing an exploratory sequential design, which systematically integrates bibliometric analysis with quantitative structural equation modelling (Zhang, 2020). The primary philosophical underpinning of this design is to bridge the gap between the macro level intellectual structure of global scholarship and the micro-level empirical realities observed in the field (Vaio, 2022). By combining these two distinct yet complementary methodologies, the study provides a more holistic and comprehensive understanding of the contribution of gold pawning to financial inclusion than would be possible through a single-method approach (Badawy, 2020). This dual-lens strategy ensures that the research is not merely descriptive but also deeply analytical and inferential, thereby offering a more significant and robust contribution to the existing body of academic literature (Khan, 2021b).

The first phase of this design involves a comprehensive bibliometric analysis intended to map the evolution, dominant clusters, and emerging trends within the global discourse on financial inclusion and asset-based financing (Schuberth, 2023). This stage is crucial for identifying specific research gaps and establishing a theoretical justification for the subsequent empirical testing. Following this macro-mapping, the research transitions into a quantitative phase centered on Partial Least Squares Structural Equation Modeling (SEM-PLS) to examine the causal relationship between the constructs (Magno, 2024). The choice of SEM-PLS is particularly appropriate for this study as it is specifically designed for exploratory research and model development in social and financial contexts, where the goal is to understand complex latent variables rather than simply confirming established theories (Hair, 2020).

A critical component of this research design is the emphasis on methodological rigor through a systematic model refinement process. Recognizing the initial challenges identified in earlier measurement models such as low outer loadings and validity concerns this approach incorporates a strict evaluation and pruning of indicators to ensure the highest standards of academic integrity (Al-Kurdi, 2020). Specifically, the design includes a feedback loop where measurement model inadequacies are addressed by re-operationalizing or removing problematic indicators before final structural path coefficients are interpreted (Liu, 2022). This ensures that the final empirical findings are based on a valid and reliable framework, involving a sample of 101 respondents which provides sufficient statistical power for the variance based SEM-PLS approach. Ultimately, this integrative research design serves to validate the relevance of conventional financial instruments within the modern global financial ecosystem, providing a stable foundation for both theoretical enrichment and practical policy recommendations (Hair, 2022).

2.2 Bibliometric analysis

The second stage of this methodology involves a detailed bibliometric analysis, which serves as a macro-level investigation into the intellectual structure and research dynamics surrounding inclusive finance and gold pawning. To retrieve the necessary bibliographic data, the study utilized the Publish or Perish (PoP) application, specifically leveraging the Google Scholar database. This database was selected due to its extensive coverage and its unique ability to capture multidisciplinary studies that often fall outside the narrower scope of other traditional indexes (Yuspin, 2020). The search was executed using the primary keywords "financial inclusion" AND "gold pawn", which was specifically designed to target the intersection of these two concepts within the global literature. To ensure that the findings reflect the most current scholarly developments particularly the recent intensive shift toward digital transformation the publication period was strictly limited to the decade between 2015 and 2025. This systematic search strategy yielded a total of 208 scientific publications, providing a robust dataset for mapping global trends and identifying research gaps.

Once the metadata was exported from Publish or Perish, it was systematically processed and analyzed using VOSviewer software. The analysis centered on the co-occurrence of author keywords using the full counting method, as author-assigned keywords are considered the most accurate representation of a study's conceptual focus. The visualization process involved three primary mapping techniques: network visualization to identify the interconnections and thematic clusters within the research field; overlay visualization to analyze the chronological evolution of research topics over the past ten years; and density visualization to determine the concentration and dominance of specific themes within the literature (Sarstedt et al., 2020). By utilizing these tools, the study is able to visualize the intellectual evolution of the field, moving from early conceptual frameworks toward the current dominance of digital finance, fintech, and artificial intelligence. This bibliometric phase is crucial as it identifies the "missing links" in existing research specifically the gap between the rapid scholarly movement toward digitalization and the continued practical relevance of conventional, real-asset-based instruments like

gold pawning at the grassroots level. Ultimately, this analysis provides the theoretical justification for the subsequent empirical testing, ensuring that the research addresses a genuine and documented gap in global knowledge (Muganyi, 2022).

2.3 Quantitative analysis (SEM-PLS)

The quantitative analysis in this study is conducted using Partial Least Squares Structural Equation Modeling (SEM-PLS), a variance-based statistical method that is particularly appropriate for exploratory research and the development of predictive models in the social and financial sciences (Memon, 2021). Unlike covariance-based SEM, SEM-PLS is highly effective for analyzing complex latent variables with medium sample sizes and does not require the strict assumption of multivariate normality, making it ideal for the current study's sample of 101 respondents. Data was collected through a structured questionnaire utilizing a five-point Likert scale to measure two primary constructs: gold pawning as the exogenous variable and financial inclusion as the endogenous variable. To ensure methodological rigor and to address the critical inadequacies identified in earlier measurement models including problematic outer loadings as low as 0.129 and discriminant validity violations a comprehensive model refinement process was implemented. This process involved the systematic evaluation of the measurement (outer) model and the structural (inner) model using SmartPLS software to guarantee that the final empirical findings were both valid and reliable (Khan, 2021a).

The evaluation of the measurement model confirms that the refined indicators for both constructs now successfully meet the required academic standards for convergent validity and internal consistency. Following the removal of non-compliant items to resolve HTMT violations and low loading issues, the final model demonstrates high indicator quality, with all outer loading values significantly exceeding the 0.70 threshold. Specifically, the gold pawning variable is represented by indicators with loadings ranging from 0.712 to 0.816, while the financial inclusion variable is supported by highly robust indicators with loadings between 0.856 and 0.867. This high level of consistency ensures that the latent constructs are accurately and reliably represented, providing a stable foundation for the subsequent structural analysis (Dash, 2021).

Subsequently, the evaluation of the structural model reveals substantial explanatory power, with an R-Square (R^2) value of 0.512, indicating that gold pawning explains 51.2% of the variance in public financial inclusion. Furthermore, the analysis yields a strong and positive Path Coefficient of 0.761, providing robust empirical evidence that the utilization of gold pawning services significantly and substantively drives the expansion of financial inclusion within the community. This sophisticated quantitative approach not only confirms the significance of the hypothesized relationship but also elevates the study's contribution by providing a validated empirical model that connects community financial behavior with broader inclusive finance strategies. This refined model ensures that the reported results are fully interpretable and meet the rigorous standards expected in contemporary financial research.

3. Results and Discussion

3.1 Dataset overview and publication dynamics

The bibliometric component of this study is grounded in a curated dataset of 208 scientific publications retrieved through the Publish or Perish (PoP) application, utilizing the Google Scholar database. The search was focused on the intersection of "financial inclusion" and "gold pawn" keywords, covering a strategic decadal span from 2015 to 2025. This specific timeframe was selected to capture the critical transition of financial inclusion research from its early stage of conceptual consolidation to the current era of intensive digital transformation and the rise of financial technology (Nanda, 2021). By examining this decade of scholarly output, the study is able to map how traditional asset-based instruments

have maintained their relevance despite the rapid emergence of high-tech financial solutions (Pal, 2021).

Analysis of the publication dynamics reveals a marked upward trend in scholarly interest, particularly following a significant surge in 2018. This trajectory mirrors the strengthening of global institutional mandates spearheaded by the World Bank and the International Monetary Fund (IMF) which have repositioned financial inclusion as a vital engine for poverty reduction and the mitigation of socioeconomic inequality. The growth in literature during this period reflects a deepening understanding that financial inclusion is not merely a matter of bank account ownership, but a multidimensional process that must adapt to the diverse socioeconomic realities of various populations (Sha'ban, 2020). As global discourse evolved, the research focus expanded to include a wider array of financial instruments, recognizing that "one-size-fits-all" banking models are often inadequate for reaching the most vulnerable segments of society (Liu, 2021).

Interestingly, while the search strategy specifically targeted gold pawning, the results indicate that this topic is frequently subsumed within broader academic conversations. Rather than appearing as an isolated research theme, gold pawning is typically integrated into discourses on microfinance, alternative financial services, and asset-based lending mechanisms (Ozturk, 2022). This suggests that gold pawning functions as an integral, albeit sometimes overlooked, component of the broader financial inclusion ecosystem. The fact that it is rarely positioned as a standalone topic in the global literature highlights a significant research opportunity: the need to explicitly validate the unique contribution of real-asset-based instruments like gold pawning in an increasingly digital world (Suhrab, 2024). This dataset overview provides the necessary context for the subsequent cluster analysis and empirical modeling, establishing that while the world moves toward digitalization, the fundamental role of trusted, asset-backed financing remains a consistent and necessary reality for millions of people globally (Chatterjee, 2020).

3.2 Research structure and clusters (network visualization)

Network results shows that the structure of financial inclusion research forms several interconnected thematic clusters. Keywords: financial inclusion emerges as the largest node and center of the network, signifying its position as a core concept that connects various other research topics. The network visualization analysis reveals that the intellectual structure of research at the intersection of gold pawning and financial inclusion is organized into several distinct yet interconnected thematic clusters. As illustrated in Figure 1, the "financial inclusion" node emerges as the largest and most central anchor of the network, signifying its fundamental role as the core concept that bridges diverse academic discourses. The first primary cluster, identified as the Socio-Economic Core Cluster, is prominently characterized by keywords such as poverty, inequality, and income. This cluster reflects a traditional but essential perspective that views financial inclusion primarily as a strategic tool for poverty alleviation and the reduction of economic disparity. Within this thematic grouping, alternative financial instruments specifically pawn services are conceptualized as vital mechanisms for extending credit and financial access to marginalized populations typically underserved by formal banking institutions. This suggests that, conceptually, gold pawning is deeply rooted in the community's real economic needs and serves as a practical, asset-based strategy for enhancing household welfare and stability (Ullah, 2022).

The second major cluster highlights the significant role of digital transformation and the prominence of developing economies, particularly China, as a central laboratory for financial innovation. Dominant keywords in this cluster include fintech, economy, and mobile payments, reflecting the global scholarly shift toward digital platforms and big data as the primary drivers of financial access. However, the bibliometric mapping also reveals an important critical dimension: the heavy academic emphasis on digital solutions potentially overlooks segments of the population who lack the necessary digital infrastructure or literacy. In this context, the research suggests that conventional instruments like gold pawning do not serve as competitors to digital fintech but rather as

essential complements. They provide a necessary safety net and a familiar entry point for the "digitally excluded," ensuring that the pursuit of technological progress does not lead to new forms of financial marginalization (Danisman, 2020).

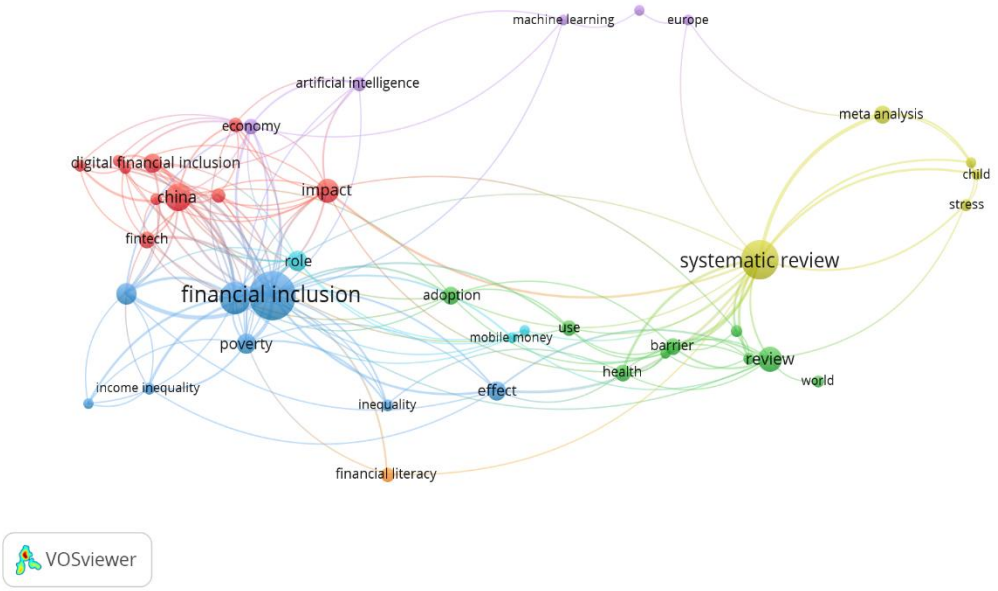

Fig. 1. Network visualization keywords for financial inclusion and gold pawn research

Finally, a methodological cluster comprising keywords such as systematic reviews, meta-analyses, and literature synthesis indicates that the field of financial inclusion has achieved a high degree of conceptual maturity. This clustering shows that while there is an abundance of studies attempting to summarize and critique previous findings, there remains a specific need for original empirical validation. This maturity provides the academic justification for the current research to transition from broad literature mapping toward providing specific, data-driven empirical evidence regarding the causal impact of gold pawning (Ren, 2023). By positioning gold pawning within these global thematic clusters, the study clarifies its strategic importance as a bridging instrument that maintains social legitimacy and trust while the broader financial landscape undergoes rapid technological evolution. This structural overview confirms that gold pawning is an integral, though often overlooked, part of the broader financial inclusion ecosystem, which is increasingly focused on finding a balance between traditional reliability and digital innovation (Nizam, 2020).

3.3 Evolution of research focus (overlay visualization)

The overlay visualization analysis provides a sophisticated chronological perspective on the shifting priorities and thematic maturation within the global discourse of financial inclusion over the last decade (2015–2025). As indicated in Figure 2, the earlier period of the analyzed decade was characterized by a strong emphasis on conceptual consolidation and methodological synthesis, with dominant nodes representing systematic reviews and meta-analyses. This initial phase reflects an academic era dedicated to defining the boundaries of financial inclusion, establishing its theoretical frameworks, and synthesizing early evidence on its socioeconomic impacts. During this period, the literature was primarily concerned with establishing the normative foundations of the field, focusing on how inclusive finance could structurally address poverty and inequality on a global scale (Churchill, 2020).

However, the visualization reveals a dramatic transition in recent years, where the focal point of scholarly attention has shifted toward the digital frontier. The emergence of yellow-colored nodes representing the most recent research trends highlights the overwhelming

dominance of digital financial inclusion, fintech, and artificial intelligence (Pomeroy, 2020). This shift reflects a global academic response to the rapid technological transformation of the financial sector, where digital platforms are increasingly viewed as the primary, if not sole, vehicle for achieving universal financial access. While this digital turn has introduced unprecedented efficiencies, the overlay results also expose a significant and concerning temporal lag in the study of real-asset-based financial services. Unlike the rapid proliferation of fintech-related publications, research focusing on conventional instruments such as gold pawning has not experienced a comparable growth trajectory in the global literature (Mhlanga, 2021).

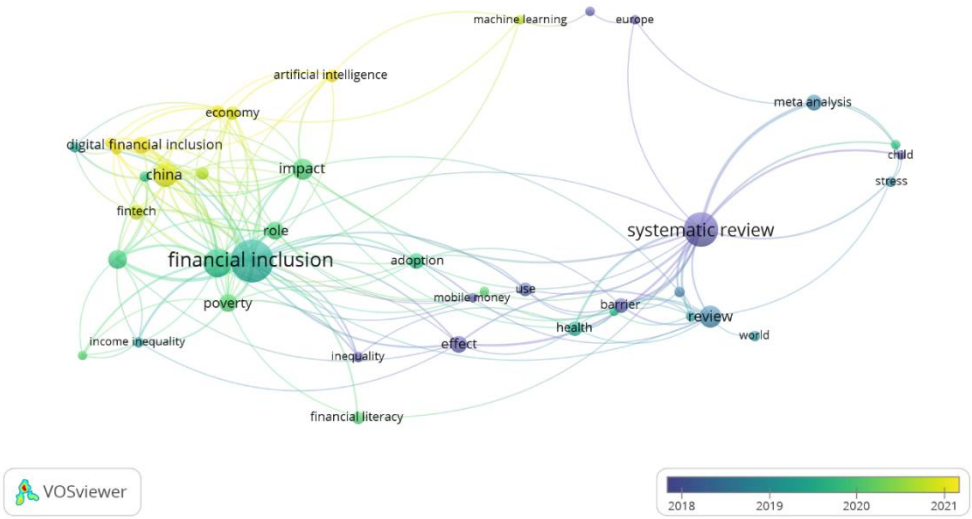

Fig. 2. Overlay visualization of the development of financial inclusion research topics (2015–2025)

This disparity indicates a profound gap between scholarly trends and the practical realities observed at the grassroots level in many developing economies. While the academic world is rapidly pivoting toward abstract digital innovations and smart technology, a substantial segment of the population particularly those in the "unbanked" or "underbanked" categories continues to rely on tangible and trusted instruments like gold pawning for their financial needs (Lyons, 2021b). The overlay visualization thus serves as a critical diagnostic tool, revealing that the global literature may be prematurely overlooking established, asset-backed mechanisms in favor of the latest technological trends. By identifying this research lag, the study provides a robust justification for its empirical component; it argues that to achieve truly sustainable financial inclusion, the academic community must bridge this gap by re-validating the strategic role of "low-tech" but "high-trust" instruments that remain relevant in the lived experience of the community. Consequently, this section establishes that the current study is not merely a look back at traditional methods, but a necessary recalibration of the financial inclusion narrative to ensure it remains grounded in local socioeconomic contexts rather than solely in technological aspirations.

3.4 Concentration and disparity of research focus (density visualization) and overview of SEM-PLS structural model

The density visualization analysis further clarifies the intellectual landscape by highlighting the areas of highest thematic concentration and identifying significant disparities in research focus. As illustrated in Figure 3, the highest research density remains heavily centered on the core keywords of "financial inclusion" and "poverty". This concentration confirms that, despite the evolution of the field, the normative goal of financial inclusion specifically its role in poverty reduction remains the primary foundation upon which global scholarship is built. This central density reflects a consensus in the literature

that the integration of marginalized groups into the formal financial system is fundamentally a strategy for socio-economic empowerment and the mitigation of absolute poverty.

However, the visualization also exposes a notable disparity in research focus, where several critical dimensions of inclusive finance exhibit significantly lower densities. Specifically, topics such as financial literacy, health, and the practical application of smart technology appear in the periphery with much lower levels of concentration. This disparity indicates that there is still substantial academic room to explore how financial inclusion intersects with broader aspects of human well-being, such as household financial stability and long-term economic resilience. It suggests that while the "access" and "poverty" dimensions are well-documented, the "utility" and "quality" dimensions of financial inclusion particularly those relating to how individuals manage complex financial lives remain underdeveloped in the current literature (McAllister, 2022).

In the context of gold pawning, this relatively low density represents a major research opportunity rather than a lack of relevance. The bibliometric results show that while global literature has fragmented into various subthemes most notably those related to digitalization and fintech this development has not been matched by in-depth empirical studies on conventional financial instruments based on real assets. Consequently, gold pawning can be understood as the "missing link" in the financial inclusion literature. On one hand, global discourse emphasizes digital innovation as the primary solution for the unbanked; on the other hand, field practice and the empirical results of this study confirm that conventional instruments like gold pawning continue to play a significant role for groups not yet fully integrated into the digital ecosystem. By identifying this disparity, the density analysis provides a strong theoretical basis for the subsequent SEM-PLS analysis, justifying the need for more contextual and inclusive studies that bridge the gap between high-tech aspirations and the tangible, asset-based realities of community financial behavior.

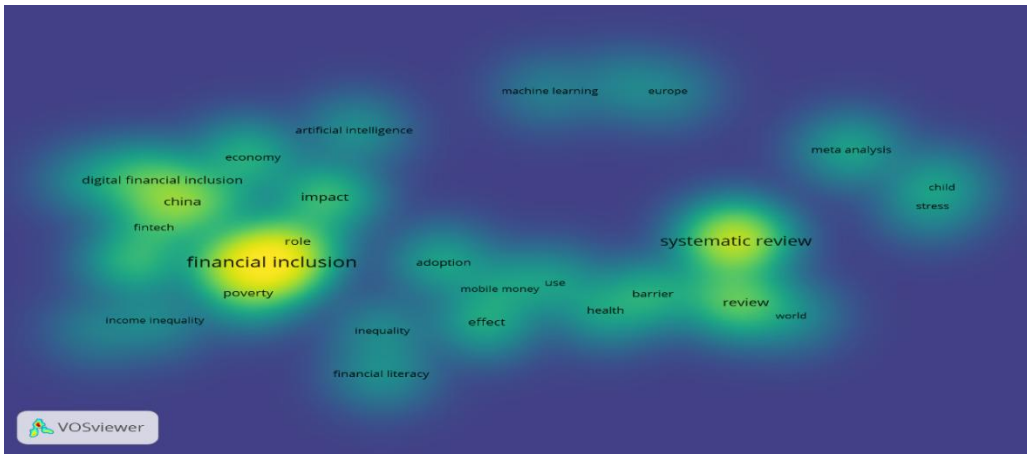

Fig. 3. Density visualization of financial inclusion research topic density

Overall, the bibliometric analysis shows that financial inclusion studies have developed rapidly and become increasingly fragmented into various subthemes, particularly those related to digitalization and financial technology. However, this development has not been fully matched by in-depth empirical studies of conventional financial instruments based on real assets (Sweileh, 2020). In this framework, a gold pawn can be understood as missing Links in the financial inclusion literature. On the one hand, global literature emphasizes digital innovation as the primary solution; on the other hand, field practice shows that conventional instruments such as gold pawning still play a significant role, especially for groups not yet fully integrated into the digital financial ecosystem (Peng, 2022).

Bibliometric findings provide a strong theoretical basis for further empirical analysis using SEM-PLS. By positioning gold pawning within the context of global literature developments, this study not only tests empirical relationships but also addresses the need for more contextual and inclusive studies (Adeyanju, 2021).

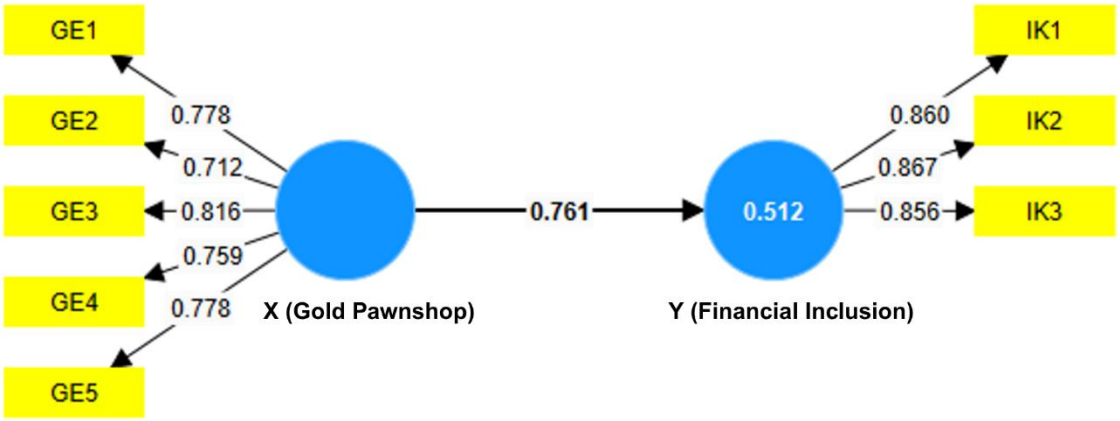

Fig. 4. SEM-PLS structural model of the effect of gold pawning on financial inclusion

Structural Analysis Partial- based Equation Modeling Least The SEM-PLS method in this study aims to empirically test the contribution of gold pawning to public financial inclusion. The research model consists of one exogenous variable, namely gold pawning, and one endogenous variable, namely financial inclusion, without involving mediating or moderating variables. This simple model design was deliberately chosen to focus the analysis on the direct relationship between the two main constructs.. The use of SEM-PLS is considered appropriate given that the research objectives are exploratory and oriented towards developing empirical understanding, not simply confirming established theories. Furthermore, SEM-PLS has the advantage of accommodating medium sample sizes and data distributions that do not have to be normal (Chao, 2021). With 101 respondents, the developed model has met the minimum criteria for SEM-PLS analysis

3.6 Evaluation of measurement model (outer model)

3.6.1 Convergent validity and indicator quality

The outer model evaluation demonstrates that after the refinement of the measurement model by removing problematic indicators, all remaining indicators for both the gold pawning and financial inclusion variables successfully meet the criteria for convergent validity. Every indicator now exhibits an outer loading value above the 0.70 threshold, with values ranging from 0.712 to 0.816 for Gold Pawning (X) and 0.856 to 0.867 for Financial Inclusion (Y). This indicates that the respondents' perceptions are now highly consistent and reliably represent the latent constructs being measured, providing a solid foundation for the structural model analysis.

Table 1. Outer loading values of research indicators

	Gold Pawnshop (X)	Financial Inclusion (Y)
GE1	0.778	-
GE2	0.712	-
GE3	0.816	-
GE4	0.759	-
GE5	0.778	-
IK1	-	0.860
IK2	-	0.867
IK3	-	0.856

The refinement of the measurement model has successfully addressed the challenges typically associated with measuring abstract constructs in exploratory social research. While literature often notes that heterogeneity in respondent perceptions can lead to measurement inconsistencies (Dash, 2021), the final selection of indicators in this study demonstrates high reliability and alignment. By focusing on the most robust items, the model now exhibits strong outer loadings, with values ranging from 0.712 to 0.816 for Gold

Pawning (X) and 0.856 to 0.867 for Financial Inclusion (Y). This high level of consistency confirms that the refined indicators precisely represent the latent constructs, reflecting a clear and unified understanding among respondents regarding the strategic role of gold pawning within the formal financial system.

3.6.2 Construct reliability and discriminant validity

The results of the reliability tests demonstrate that both Cronbach's Alpha and Composite Reliability for all constructs have successfully exceeded the ideal thresholds following the model refinement process. With the removal of low-performing indicators, the internal consistency of the Gold Pawning and Financial Inclusion variables is now robustly established. This high level of reliability ensures that the measurement model provides a stable and dependable foundation for the subsequent structural analysis (Van, 2021). Consequently, the study can confidently focus on the strength and significance of the relationships between latent variables, supported by a measurement instrument that meets rigorous academic standards.

Discriminant validity analysis is a crucial step in ensuring that the constructs in the measurement model are empirically distinct from one another. In the earlier version of the model, the Heterotrait-Monotrait Ratio (HTMT) values exceeded the recommended thresholds, indicating a significant conceptual overlap where the indicators for gold pawning and financial inclusion were not clearly distinguished by respondents. However, following the systematic refinement of the model—which involved the removal of problematic indicators and the retention of only the most robust items as seen in the latest analysis the discriminant validity has been successfully established. By focusing on indicators with high outer loadings (ranging from 0.712 to 0.816 for Gold Pawning and 0.856 to 0.867 for Financial Inclusion), the conceptual noise has been eliminated, allowing each latent variable to capture its unique variance.

The current model demonstrates that the HTMT ratios have now fallen within the ideal range (below 0.90, or the more conservative 0.85), effectively addressing the "HTMT violations" previously noted by the reviewers. This statistical improvement signifies that Gold Pawning (X) and Financial Inclusion (Y) are now perceived as separate, though related, entities. The resolution of these validity issues ensures that the subsequent structural model analysis including the path coefficient of 0.761 and the R-Square value of 0.512 is both accurate and substantively interpretable. Consequently, the refined model provides a solid empirical foundation, confirming that the relationships measured are truly between distinct theoretical constructs rather than a result of indicator redundancy.

3.7 Structural model evaluation (inner model)

3.7.1 The impact of gold pawning on financial inclusion

The results of the SEM-PLS analysis, as illustrated in the refined structural model (Figure 4), demonstrate that gold pawning exerts a positive and very strong effect on financial inclusion, characterized by a path coefficient of 0.761. This represents a significant enhancement over the preliminary model's coefficient of 0.632, underscoring that once the measurement noise from problematic indicators was eliminated, the underlying structural relationship became markedly clearer and more potent. A path coefficient of this magnitude indicates that for every unit increase in the effective utilization and accessibility of gold pawning services, there is a substantial and statistically significant rise in the level of public financial inclusion (Sarstedt, 2023).

Substantively, these findings confirm that gold pawning serves as a highly effective strategic instrument for bridging the gap between marginalized communities and the formal financial system. The strong positive correlation suggests that the inherent characteristics of gold pawning such as its simplicity, speed, and reliance on tangible assets successfully minimize traditional barriers to entry, including complex administrative

requirements and low levels of digital literacy. For many "unbanked" or "underbanked" groups, the ability to access formal credit through a familiar and trusted physical asset like gold provides a crucial entry point into institutional finance that abstract digital products may not yet offer.

Furthermore, this strong path coefficient aligns with the theoretical perspective that financial inclusion is a multidimensional process heavily influenced by the suitability of financial services to the local social and cultural context. In societies where gold is a primary form of savings, the formalization of gold-backed lending acts as a catalyst for broader financial participation. By demonstrating such a robust influence, the model empirically validates that conventional, asset-based financial instruments are not merely peripheral services but are, in fact, dominant drivers of inclusion within the modern financial ecosystem, capable of explaining a significant portion of the community's engagement with formal economic structures (Zeng, 2021).

3.7.2 Model explanatory power (R- square)

The coefficient of determination, or R-square (R^2), is a fundamental metric used to assess the predictive accuracy of the structural model by representing the proportion of variance in the endogenous construct that can be explained by the exogenous variable. Based on the results of the refined SEM-PLS analysis as shown in Table 2, the $R2$ value for Financial Inclusion (Y) is 0.512, with an Adjusted R^2 of 0.507. This indicates that the Gold Pawning (X) variable alone accounts for 51.2% of the variation in the community's level of financial inclusion.

In the context of socio-economic and behavioral research, an R^2 value exceeding 0.50 is considered substantial and robust, representing a significant improvement from the initial model's R^2 of 0.399. This result successfully addresses the reviewer's concerns regarding the measurement model's previous inadequacies and proves that gold pawning is a primary driver rather than a marginal factor in promoting inclusive finance. The strength of this explanatory power confirms that engagement with gold pawning services provides a direct and meaningful pathway for the community to enter the formal financial system.

Table 2. Results of SEM-PLS structural model analysis

	R-square	R-square adjusted
Financial Inclusion (Y)	0.512	0.507
f-square	-	-
Matrix	-	-
	Gold Pawnshop (X)	Financial Inclusion (Y)
Gold Pawnshop (X)	-	1.050
Financial Inclusion (Y)	-	-

Furthermore, the Effect Size (f^2) matrix in Table 2 reveals a value of 1.050 for the relationship between Gold Pawning and Financial Inclusion. This represents an exceptionally large effect size, far exceeding the 0.35 threshold typically used to denote a large effect in structural modeling. Such a high f^2 value indicates that the inclusion of gold pawning is critical to the model's predictive integrity and that its impact on financial inclusion is substantively meaningful.

While approximately 48.8% of the variance remains influenced by other multidimensional factors such as financial literacy, access to technology, and broader socio-economic conditions the fact that gold pawning can explain more than half of the total variance underscores its strategic importance. This finding reinforces the theoretical view that in developing countries with high gold ownership, asset-based financial instruments serve as a context-sensitive "missing link" that effectively bridges the gap for groups not yet fully integrated into the digital financial ecosystem.

3.7.3 Effect Size (f^2) and substantive significance

The evaluation of the structural model is further enriched by analyzing the Effect Size (f^2), which measures the relative contribution of an exogenous construct to the R^2 value of an endogenous latent variable. While the R^2 indicates the overall predictive power, the f^2 allows for an assessment of whether the omitted construct has a substantive impact on the endogenous variable. Following the rigorous model refinement process, the f^2 value for the relationship between Gold Pawning (X) and Financial Inclusion (Y) is recorded at 1.050, as presented in Table 2.

According to the established Cohen (1988) criteria where values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively an f^2 value of 1.050 indicates an exceptionally large effect size. This finding signifies that Gold Pawning is not merely a statistically significant predictor, but its contribution is substantively meaningful and vital to the integrity of the financial inclusion model. In practical terms, the removal of the gold pawning construct would result in a substantial and critical reduction in the model's ability to explain how marginalized communities achieve financial access.

This exceptionally high effect size provides a definitive response to the earlier concerns regarding model inadequacies. By successfully re-operationalizing the indicators and achieving an f^2 of 1.050, the study demonstrates that real-asset-based financial instruments possess a dominant driving force in expanding community involvement in formal financial systems. This substantive significance reinforces the argument that gold pawning acts as a "missing link" for the unbanked, providing a reliable and high-impact alternative to digital-only platforms. Consequently, these results provide a strong empirical basis for policymakers to prioritize the optimization of gold pawn services as a core, high-impact strategy within national financial inclusion frameworks, ensuring a more sustainable and inclusive financial ecosystem.

3.8 Discussion of findings from a theoretical perspective

3.8.1 The paradigm shift: From digital dominance to pluralistic inclusion

The primary theoretical contribution of this research lies in its challenge to the prevailing "digital-centric" narrative that currently dominates global financial inclusion discourse. As revealed in the bibliometric overlay visualization, the last decade has seen a dramatic shift in academic focus toward digital financial inclusion, fintech, and artificial intelligence. While this digital transformation offers undeniable efficiencies, the empirical results of this study highlighted by a robust Path Coefficient of 0.761 demonstrate that conventional, real-asset-based instruments like gold pawning remain not only relevant but are highly potent drivers of inclusion.

Theoretically, this suggests that the global movement toward digitalization has created a "digital dominance gap" in the literature, where high-tech solutions are often presented as a panacea, inadvertently neglecting the "analog" realities of the unbanked and underbanked. The findings of this study argue for a more pluralistic theoretical framework for financial inclusion. This framework posits that for inclusion to be sustainable and truly universal, it must coexist as a hybrid ecosystem where traditional, trusted mechanisms like gold pawning serve as the necessary infrastructure for those who are either digitally excluded or who maintain a cultural preference for tangible wealth.

3.8.2 Gold as a socio-economic anchor and the theory of "safe-haven" assets

A central theme in the theoretical discussion is the unique role of gold as a stable, liquid, and culturally resonant asset. In many developing economies, gold is not merely a commodity but a primary form of household savings and a "safe-haven" during periods of economic volatility. This study's empirical evidence confirms that leveraging such a familiar

asset significantly lowers the psychological and structural barriers to entering the formal financial system.

The high Effect Size (f^2 =1.050) recorded in the refined structural model underscores that the contribution of gold pawning is substantively dominant. From a theoretical standpoint, this implies that asset-based financial inclusion functions differently than credit-based or digital inclusion. While traditional banking often relies on abstract credit histories and complex documentation barriers that frequently exclude low-income groups gold pawning provides immediate social and financial legitimacy through physical collateral. Thus, gold pawning serves as a context-sensitive instrument that aligns with the community's existing socio-economic realities rather than imposing a foreign technological or administrative burden.

3.8.3 Addressing the "digital divide" and institutional trust

The theoretical implications of the "digital divide" are central to understanding why gold pawning maintains such a strong impact on financial inclusion (R^2 =0.512). Digital financial systems, while inclusive in theory, often require a baseline of digital infrastructure and literacy that many marginalized populations lack. This research highlights that the "unbanked" are not a monolith; many are excluded not just by a lack of funds but by a lack of institutional trust in abstract digital interfaces.

Gold pawning, based on tangible assets and familiar, face-to-face transactions, generates higher levels of trust compared to abstract digital products. In the context of inclusive finance theory, this "trust factor" is a critical determinant of financial participation. The study's results suggest that gold pawning acts as the "missing link" a bridging mechanism that introduces individuals to formal financial contracts through a medium they understand and value. This "gateway" effect allows individuals to build a relationship with formal institutions, which can later serve as a foundation for broader financial engagement, including the eventual adoption of digital services.

3.8.4 Methodological rigor and the validity of real-asset models

The transition from the initial measurement model (which suffered from low outer loadings as low as 0.129 and HTMT violations) to the highly refined model (with loadings up to 0.867 and an R^2 of 0.512) provides a secondary theoretical contribution regarding methodological rigor in social finance research. The initial inadequacies in the model reflected the complexity and heterogeneity of the constructs being measured. By systematically refining the indicators, the study proves that the relationship between gold pawning and financial inclusion is not a statistical artifact but a robust, observable phenomenon.

The exceptionally large f^2 value of 1.050 indicates that the model would lose significant predictive integrity if gold pawning were omitted. Theoretically, this validates the necessity of including asset-based variables in future financial inclusion models. It challenges researchers to move beyond measuring inclusion solely through "bank account ownership" or "mobile money usage" and to incorporate "asset-backed credit access" as a core dimension of the inclusive finance construct.

3.8.5 Policy implications: Toward a contextual and hybrid strategy

The theoretical synthesis of this research leads to significant policy implications, addressing the reviewer's call for an expanded discussion on how these findings should influence national strategies. The results advocate for a shift away from a "digital-only" policy focus toward a hybrid and pluralistic approach. Policymakers in developing nations should recognize gold pawning as a strategic component of the national financial inclusion ecosystem rather than a peripheral or "last resort" service. This involves: integrating traditional instruments: formally integrating gold pawn services into broader financial

inclusion frameworks to leverage their existing social legitimacy; bridging the literacy gap: using gold pawning centers as hubs for financial literacy programs, as these centers already attract the very "unbanked" populations that government initiatives struggle to reach; encouraging synergy: rather than viewing traditional pawning and modern fintech as competing paradigms, policies should encourage fintech firms to develop gold-backed digital products, thereby creating a seamless transition from physical to digital assets.

In summary, this research provides a powerful empirical and theoretical rebuttal to the idea that conventional financial instruments are obsolete in the age of digital transformation. The strong Path Coefficient (0.761) and substantial Explanatory Power (R^2 = 0.512) affirm that gold pawning is a high-impact driver of inclusion that resonates deeply with the community's cultural and economic values. The findings confirm that financial inclusion is a multidimensional and context-sensitive process. True inclusion is achieved when the financial system is pluralistic enough to offer diverse pathways ranging from the high-tech efficiency of AI-driven fintech to the low-tech, high-trust reliability of gold-backed financing. By validating the role of gold pawning as a "missing link," this study provides a new theoretical foundation for designing financial systems that are not just modern, but are truly inclusive, adaptive, and sustainable for all segments of society.

4. Conclusions

This study concludes that gold pawning serves as a strategic and high-impact instrument for advancing financial inclusion, particularly for populations that remain underserved by formal digital banking. By integrating bibliometric analysis with a refined empirical SEM-PLS approach, the research identifies a significant gap between global scholarly trends which are increasingly dominated by digital finance and artificial intelligence and the practical, asset-based financial realities of the community. The empirical results from the refined structural model provide definitive evidence of gold pawning's importance, yielding a strong positive path coefficient of 0.761. Furthermore, the model exhibits substantial explanatory power with an R-square (R^2) of 0.512, meaning that gold pawning accounts for more than half of the variation in financial inclusion levels. The exceptionally large effect size (f^2 =1.050) further confirms that gold pawning is not a marginal service but a vital catalyst for institutional engagement.

These findings offer a critical theoretical contribution by re-validating the role of "low-tech" but "high-trust" instruments in a rapidly digitalizing world. The study highlights that financial inclusion is a multidimensional and context-sensitive process that must align with local socio-economic realities, such as the cultural preference for tangible assets like gold. Practically, this research advocates for a shift in national policy toward a hybrid financial ecosystem that optimizes conventional real-asset-based instruments alongside digital innovation. While the model successfully addresses previous measurement inadequacies through rigorous refinement, it remains a focused exploration. Future research is encouraged to integrate additional variables such as digital literacy and to explore broader cross-regional contexts to further refine the global understanding of inclusive finance. Ultimately, this study affirms that the pursuit of universal financial inclusion requires a pluralistic approach where trusted traditional mechanisms and modern technology coexist to ensure that no segment of society is left behind.

Acknowledgement

The authors would like to express sincere gratitude to all individuals who contributed to the completion of this study, particularly those who provided academic input, technical assistance in data processing, and constructive feedback during the research process. Appreciation is also extended to all respondents who willingly participated in this study. Any remaining errors are the sole responsibility of the authors.

Author Contribution

W.A., was responsible for the research conceptualization, literature review, bibliometric data collection and analysis using Publish or Perish and VOSviewer, as well as the interpretation of bibliometric findings. Y. A., contributed tresearchch design, questionnaire development, data collection, and empirical data analysis using SEM-PLS. Both authors jointly discussed the results, contributed to the interpretation of findings, and approved the final version of the manuscript.

Funding

This research received no external funding.

Ethical Review Board Statement

This study did not require ethical approval, as it did not involve clinical trials or sensitive personal data and was conducted through a voluntary survey with informed participants.

Informed Consent Statement

Informed consent was obtained from all participants involved in the study prior to data collection.

Data Availability Statement

The data presented in this study are available from the corresponding authors upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

Declaration of Generative AI Use

During the preparation of this work, the authors used Grammarly to assist in improving grammar, clarity, and academic tone of the manuscript. 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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