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Addressing the gap: A review of Fintech literature in the age of finance 4.0 and Agentic AI

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Abstract

The financial industry is undergoing a structural shift from traditional digital tools toward Finance 4.0 and Agentic AI, intelligent systems capable of reasoning, planning and autonomous action. Existing Fintech literature, however, largely focuses on early-stage adoption and fails to capture this transformative shift. Addressing this gap, this study provides the first systematic synthesis of Fintech research within the emergent contexts of Finance 4.0 and Agentic AI. We employ a dual-method approach, combining a quantitative bibliometric analysis of 318 Scopus-indexed articles (2015–2024) with a qualitative narrative review of the 55 most-cited papers and 14 high-impact non-Scopus sources (including leading working papers). Our analysis reveals three core research streams: (1) Adoption & Innovation, (2) Market Impact & Inclusion and (3) Regulation & Stability. We map these streams to five foundational theories, i.e., Diffusion Theory, the Technology Acceptance Model (TAM), Financial Intermediation Theory, Inclusion Theory and Regulatory Arbitrage Theory, providing empirical validation while exposing critical contradictions and gaps. Key findings reveal a significant intellectual fragmentation: tech-heavy research (e.g., AI, machine learning) remains disconnected from socioeconomic objectives (e.g., income equality, financial inclusion) and regulatory policy frameworks. Based on this synthesis, we propose a targeted future research agenda prioritising three under-explored areas: the moderating role of regulatory regimes on AI-driven inequality, the long-term performance of bank-Fintech alliances in autonomous finance and the harmonisation of cross-national regulations for Agentic AI. This study offers regulators and financial institutions a necessary roadmap to navigate systemic risks from algorithmic bias to market volatility before they escalate in the Finance 4.0 era.

***Keywords*:** Fintech, Finance 4.0, Agentic AI, Bibliometric Analysis, Narrative Literature Review, Financial Inclusion, Regulatory Arbitrage

JEL Classification: G20, G21, O33, P34

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1. Introduction

Finance 4.0 signifies the integration of digital technologies, with financial innovation across banks, non-bank financial institutions, stock markets, peer-to-peer (P2P) platforms and cryptocurrency exchanges. Scholars broadly define this convergence as Fintech (Cappa et al., 2022; Carlini et al., 2022; Lorenzo & Arroyo, 2022), a dynamic force reshaping global finance. However, as the financial industry now shifts toward Agentic AI and autonomous finance (World Economic Forum, 2024; FinRegLab, 2025), the landscape is evolving beyond mere digital tools to intelligent systems capable of making independent financial decisions. Despite this shift in technical structure, the existing literature remains focused on distinct themes: opportunities and challenges (Albarrak & Alokley, 2021; Wu & Kao, 2022; Rahman et al., 2023); income inequality (Demir et al., 2020; Chinoda & Mashamba, 2021; Liu et al., 2023); and financial inclusion (Ahamadou & Agada, 2023; Asif et al., 2023; Khan & Alhadi, 2022; Noreen et al., 2022; Loo, 2019; Kanga et al., 2022; Joseph et al., 2021; Banna et al., 2021). While these studies are valuable, the pressing need is for a systematic mapping that offers a broader perspective and a unified roadmap (Cambridge Centre for Alternative Finance, 2025). This study is the first to synthesize Fintech literature within the emergent contexts of Finance 4.0 and Agentic AI. Overlooking this convergence poses severe macroeconomic risks. For instance, autonomous systems can trigger volatility, as algorithmic decision-making may cause market instability (World Economic Forum, 2024). Unregulated AI-driven credit scoring models can create a new digital divide, in which biased algorithms systemically exclude vulnerable populations, effectively invalidating a decade of progress in financial inclusion (FinRegLab, 2025). This study, therefore, provides a necessary roadmap to identify such systemic vulnerabilities before they escalate into a global contagion in the Finance 4.0 era.

While systematic literature reviews are the gold standard for answering well-defined research questions with minimal bias, we employed a dual-method approach that integrates quantitative bibliometric analysis with qualitative content analysis (Khan et al., 2020; 2022). The approach leverages the strengths of an interpretive approach over a purely systematic one. Given the transformative and rapidly evolving nature of Fintech, a conventional systematic review with rigid inclusion criteria may overlook important conceptual and emerging contributions. As noted by Green, Johnson, and Adams (2006), a narrative approach offers the flexibility to provide a broader, holistic overview and synthesize diverse perspectives. This is essential for identifying themes and emergent trends that traditional, peer-reviewed articles may not yet capture, given the rapid development the financial industry is undergoing. Our combined method, therefore, enabled a comprehensive, theory-driven synthesis of the Fintech literature, capturing a more nuanced understanding of research gaps than a purely systematic review would permit.

We selected the Scopus database for its comprehensive coverage of peer-reviewed economics and finance literature, retrieving 318 English language articles (2015–2024) published across 143

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journals by 818 authors. For our content analysis, we synthesized the findings from the 55 most cited research papers and supplemented this corpus with non-Scopus sources, including leading working papers and articles from journals with high impact factors. Our investigation is guided by three core research questions:

1. What are the intellectual structures and most influential authors in the current Fintech literature, and what research questions have been addressed by this body of work? Furthermore, what significant research gaps remain unaddressed?

2. How do the thematic clusters identified in the literature align with established economic theories?

3. What critical research gaps and future directions emerge from synthesizing current empirical findings with significant technological shifts (Finance 4.0 and Agentic AI)?

The following five foundational theories: Diffusion Theory, TAM, Financial Intermediation Theory, Inclusion Theory, and Regulatory Arbitrage Theory provide a holistic analytical framework for addressing our research questions. Specifically, Diffusion Theory and TAM explain the cognitive and market-entry drivers within the Adoption & Innovation research stream, Financial Intermediation Theory and Inclusion Theory offer the macroeconomic grounding necessary to evaluate the Market Impact & Inclusion stream. Finally, Regulatory Arbitrage Theory offers a critical framework for the Regulation & Stability stream, enabling us to examine how Fintech firms navigate cross-jurisdictional complexities, a need that becomes particularly urgent as the industry shifts towards autonomous systems. The rest of the paper is structured as follows: Section 2 details the data collection and mixed-methods analytical framework. Section 3 presents the three intellectual streams, key clusters, and their evolution over time. Section 4 provides a discussion, mapping these streams to foundational theories to highlight findings and gaps. Finally, section 5 concludes by discussing the study's key implications.

2. Methodology and Data Selection

2.1 Methodology

The term "bibliometrics" was first introduced by Pritchard (1969) in the Journal of Documentation, building on the foundational work of Price (1965) on quantitative measures of scientific communication. Since then, bibliometric methods have been widely adopted in business and finance research to map scholarly landscapes and identify intellectual themes (Paltrinieri et al., 2019; Bahoo et al., 2020). In line with this idea and established best practices (Aria and Cuccurullo, 2017), we employed the Bibliometrix package in RStudio to conduct our analysis across five dimensions, as shown in Table 1.

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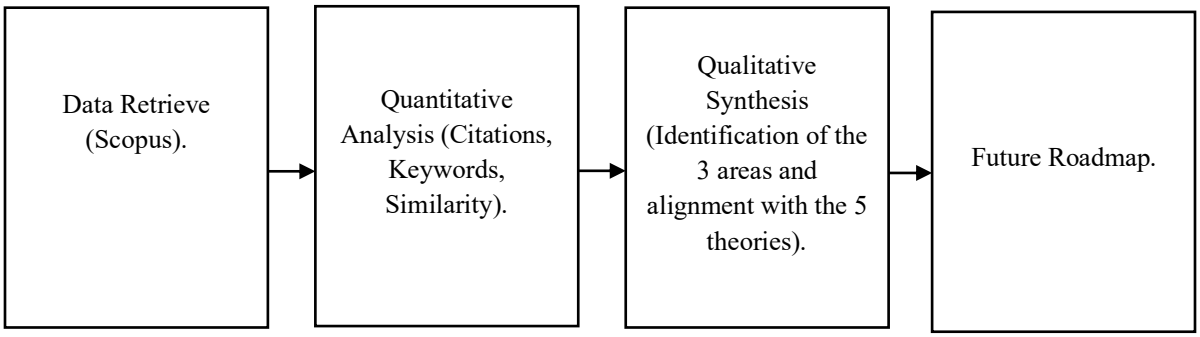
Table 1. Five Dimensions

Dimensions	Purpose	Output
Co-word & Dendrogram	Reveal thematic clusters by keywords co-occurrence.	A hierarchical dendrogram of narrative areas.
Thematic Mapping	Assess the theme's maturity and centrality.	Strategic diagrams (Motor, Niche, Basic, Emerging).
Co-authorship & Citation	Identify the most influential researchers, institutions and countries.	Network graphs and citation-rank tables.
Network Visualization	Pinpoint bridging concepts across streams.	VOS viewer network graphs.
Content Analysis	The qualitative "Narrative" component.	Theoretical alignments and research gaps.

The study followed a rigorous, transparent and replicable method, graphically depicted in Figure 1. The workflow began with data retrieval from Scopus and proceeded through tracing the Fintech literature's evolution, structuring it into thematic streams, linking it to established theories and finally, pinpointing future research and directions.

Figure 1. Overview of the Bibliometric and Narrative Literature Review Workflow



This study employs a three-stage sampling procedure to create a focused corpus of Fintech literature. First, the Scopus database was selected for its comprehensive coverage of peer-reviewed journals in Economics and Finance and its advanced filtering capabilities, following established bibliometric protocols (Paltrinieri et al., 2019). Second, we executed a title–abstract–keyword query for "Fintech" or "fintech," which initially retrieved 10,314 records. We then refined this set by limiting subject areas to Economics, Econometrics and Finance; document type to articles; language to English; publication years to 2015–2024; and access status to open access. Finally, we conducted a manual relevance screening of each article title and abstract as per the PRISMA protocol to ensure that Fintech innovations, platforms, or services were the primary focus, excluding papers where Fintech was mentioned only superficially. This process yielded a final corpus of 318 articles (Appendix A.1). To bridge the gap between Finance 4.0 theory and practice,

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this Scopus data was further supplemented by a supplementary set of 14 non-Scopus articles, including leading working papers and high impact journals.

3. Findings

3.1 Descriptive Bibliometric Performance

3.1.1 Descriptive performance

The 318 articles in our corpus, detailed in Table 2 (Appendix A.2), were published across 143 journals by a collaborative network of 818 authors. The foundation of economics-focused Fintech research is marked by the early work of Yan et al. (2015), which investigated the transformative impact of peer-to-peer (P2P) lending, a foundational topic in the first wave of digital finance innovation. Table 2 reveals a significant trend in collaboration; only 47 papers were single-authored, confirming the strong culture of multidisciplinary partnership within Fintech literature. The average of 19 citations per paper, further indicates growing scholarly interest in the field. Furthermore, the corpus contains 955 author keywords and 87 Keywords Plus entries, reflecting a broad diverse thematic scope. Finally, Figure 2 depicts the overtime progression of annual publications and citations for the subject area (Appendix A.2).

3.1.2 Top journals publishing on Fintech

As shown in Table 3 (Appendix A.2), Financial Innovation leads the field with 24 articles (8% of the sample). It is followed by the Journal of Risk and Financial Management (21 articles), the Journal of Open Innovation: Technology Market and Complexity (12 articles), Investment Management and Financial Innovations (8 articles) and Research in International Business and Finance (8 articles). Together, these journals form the primary core area for rapid development of Finance 4.0 research.

3.1.3 Significantly contributing manuscripts and most productive authors

Table 4 (Appendix A.3) compiled the most influential manuscript in the Fintech domain, the sample set a minimum threshold of 85 citations. Ozili P. K. authored the most influential work (597 citations), followed by Buchak G. (457 citations) and Haddad C. (292 citations). The key issues addressed by these seminal works laid the groundwork for the current shift toward autonomous systems and are categorized into our three research streams:

- Adoption & Innovation: Understanding the technological and economic determinants inducing ventures to rediscover Fintech (Haddad & Hornuf, 2019) and the early classification of innovative services (Gimpel et al., 2017).
- Market Impact & Inclusion: Evaluating how digital finance contributes to inclusion in emerging economies (Ozili, 2018; 2021), its impact on income inequality (Demir et al., 2020) and the expansion of credit access (Jagtiani & Lemieux, 2018).

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- Regulation & Stability: Analysing the competition between traditional and shadow banks (Buchak et al., 2018), challenges to traditional regulatory systems (Anagnostopoulos, 2018) and the understanding of decentralized finance (DeFi) (Zetzsche et al., 2020).

Finally, Table 5 (Appendix A.3) identifies Banna H., Grassi L. and Hornuf L. as the most productive authors, each contributing 4 articles to the sample. Their production over time, visualized in Figure 3 (Appendix A.3), demonstrates the consistent growth and maturity of the intellectual structure within the Fintech landscape.

3.2 Co-Word Analysis and Dendrogram

A dendrogram visually represents the hierarchical clustering of keywords. It groups concepts that frequently co-occur to reveal the field's underlying intellectual structure. As depicted in Figure 4, the analysis reveals three primary clusters, each corresponding to a distinct thematic domain within the Fintech literature.

The Foundational Technology Cluster (Blue): This cluster comprises foundational constructs such as "blockchain technology," "bitcoin," and "information asymmetry". The co-occurrence of these terms underscores their centrality in early research on Fintech, particularly regarding the maturation of decentralized finance (DeFi) platforms. Here, blockchain serves as a catalyst for trust-minimizing mechanisms that alleviate traditional information frictions, providing the essential infrastructure for the current pivot toward autonomous finance.

The Policy & Socioeconomic Cluster (Red): This stream integrates keywords such as "financial inclusion," "regulation," and "financial markets," reflecting a research trend focused on the societal impacts of digital financial services. The prominence of "financial inclusion" indicates a sustained interest in expanding credit access for underserved populations, while "regulation" signals an ongoing debate over the governance frameworks required to mitigate systemic risks in evolving ecosystems.

The Computational Innovation Cluster (Green): Characterized by "machine learning," "AI," and "digital transformation," this cluster explores how data-driven methodologies are reshaping credit scoring and operational efficiencies. These patterns suggest a convergence between longstanding financial practices and cutting-edge computational techniques, charting the path for Fintech's next wave of Agentic AI innovation.

Despite these clear thematic domains, the dendrogram exposes a notable lack of inter-cluster linkages. The infrequent co-occurrence between the technological (Blue), policy (Red) and innovation (Green) clusters points to a significant fragmentation in current research. This gap highlights a critical need for cross-disciplinary research integrating technological, regulatory and socioeconomic dimensions.

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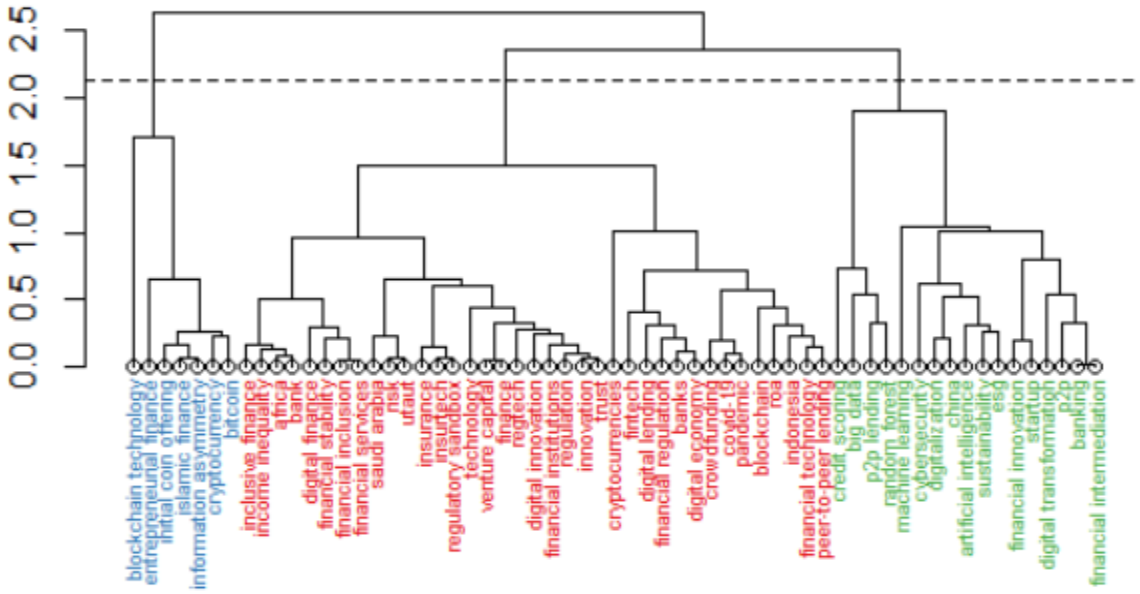
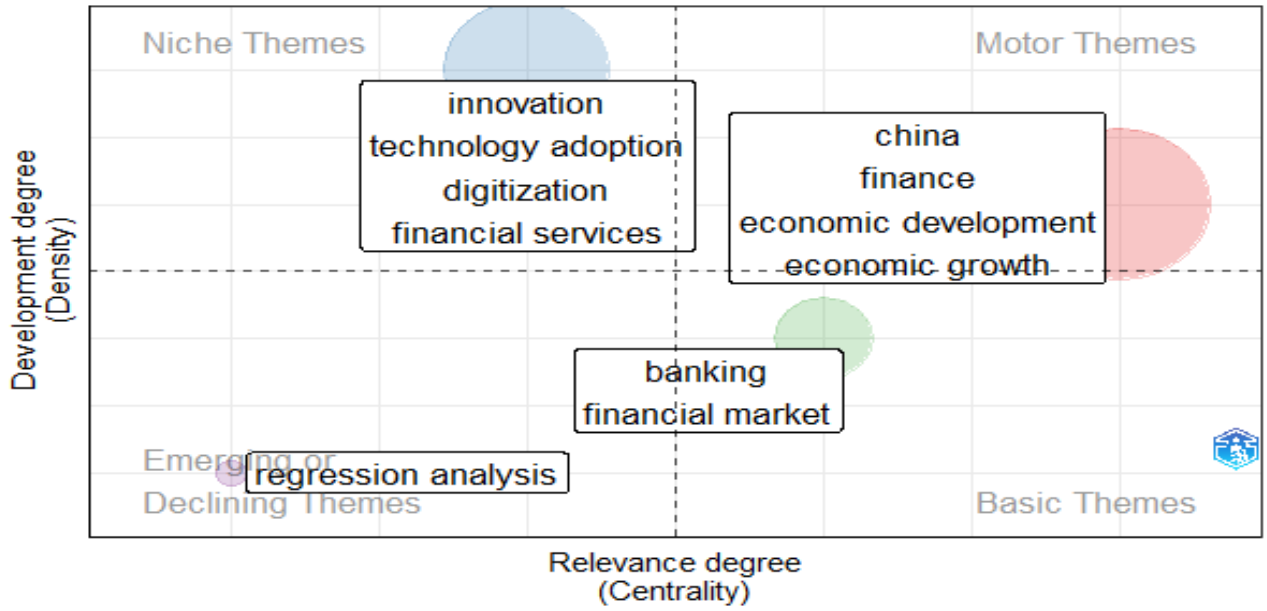
Figure 4. Dendrogram



3.3 Thematic Mapping and Conceptual Structure

Figure 5 classifies themes into a two-dimensional diagram. It reveals four distinct quadrants within

Figure 5. Thematic Map



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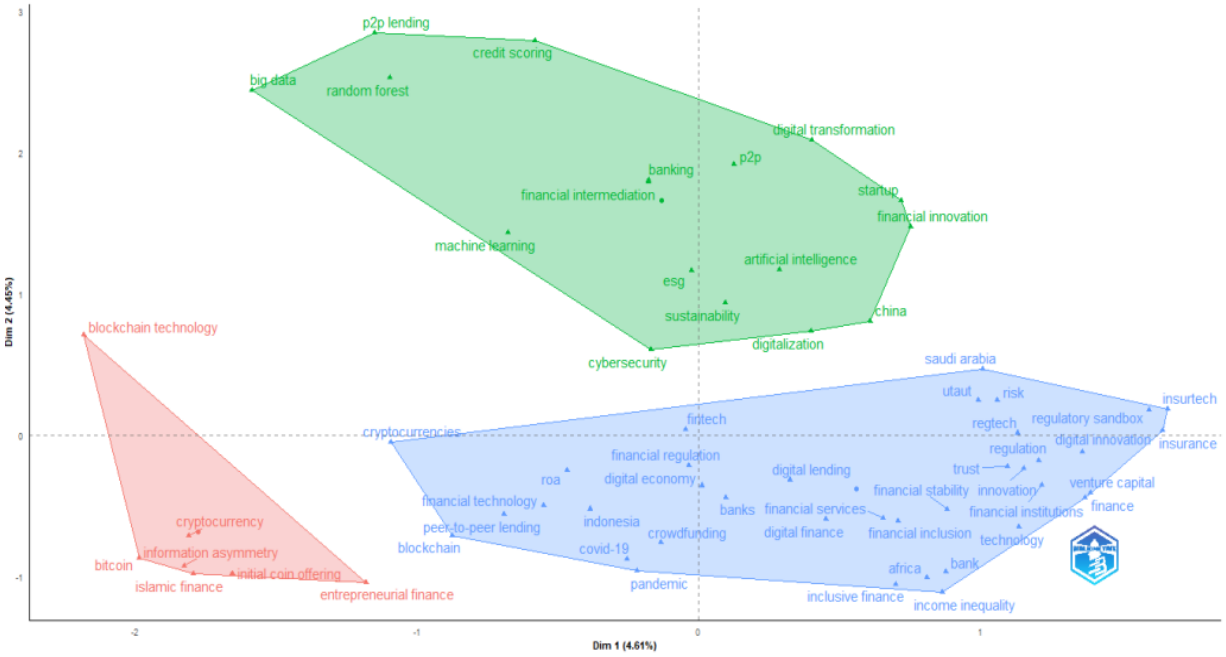
the current Fintech landscape: Motor themes - China, finance, economic development and economic growth, represent well-studied areas that serve as the core driving force behind much of the existing research. In contrast, basic themes - banking and financial markets are foundational but appear relatively underdeveloped within the Fintech context. This indicates significant opportunities for deeper exploration as traditional institutions move toward Finance 4.0 integration. Niche themes - innovation and digitization, are specialized and contribute meaningfully, though they remain less integrated into broader academic debates. Finally, emerging or declining themes, such as regression analysis, indicate underutilized methodologies. This highlights a critical gap in the application of rigorous econometric models necessary to understand causal relationships in bank-Fintech partnerships.

Using co-word analysis and clustering algorithms, Figure 6 presents the relationships between different ideas by identifying the conceptual structure of a framework that groups terms into thematic areas. The analysis has been conducted using Author's keywords by applying Correspondence Analysis and K-Means clustering. The method also involved Natural Language Processing (NLP) performed with the use of stemming.

Figure 6. Conceptual Structure Map



The keyword co-occurrence analysis revealed three major thematic clusters. The green cluster is characterized by data-driven and technology-oriented terms such as "machine learning", "big data", "ESG" and "cybersecurity", reflecting the increasing integration of advanced computational tools, laying the groundwork for the era of Agentic AI. The red cluster centres around crypto-related topics, including "bitcoin", "blockchain" and "initial coin offerings", indicating a strong

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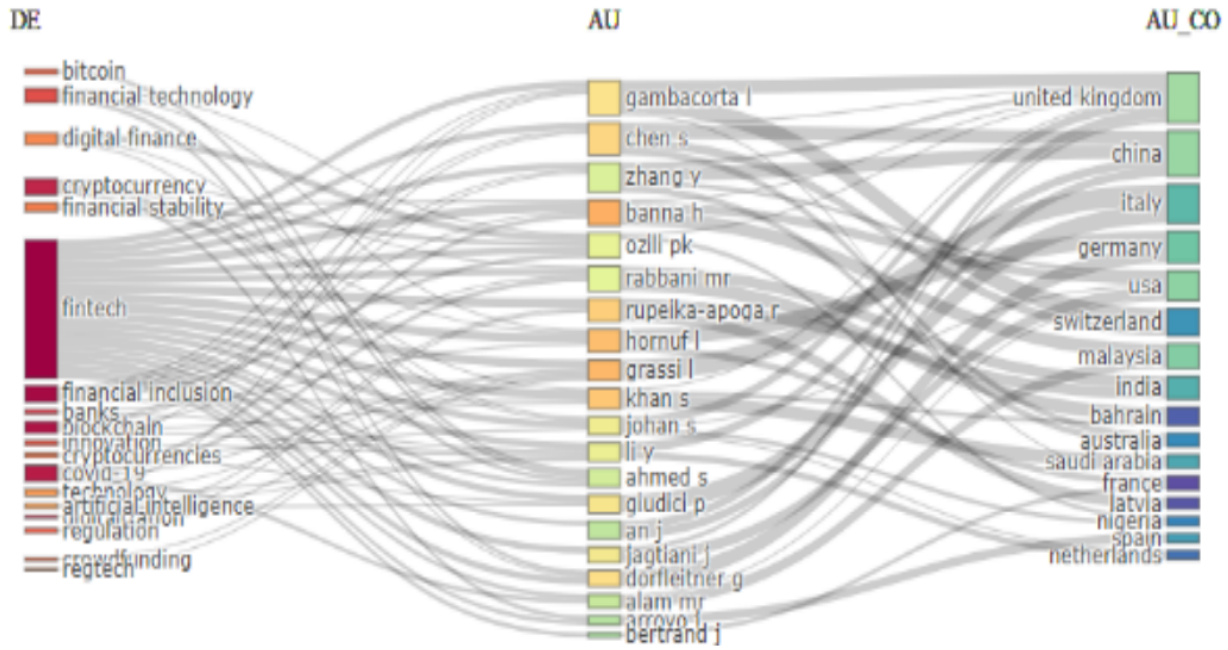
focus on decentralized finance and digital assets. Lastly, the blue cluster emphasizes policy and economic development themes, with keywords such as “financial inclusion”, “stability”, “income inequality” and “regulation”, highlighting the socio-economic implications and governance challenges associated with Fintech.

This analysis reinforces earlier findings and highlights a significant intellectual disconnect between tech-heavy research (Green) and socioeconomic objectives (Blue). Very few studies currently bridge advanced computational techniques, such as machine learning, with practical financial inclusion outcomes. Bridging these gaps is essential for understanding how technology can scale equitable outcomes, suggesting that future research must prioritize AI-enabled financial inclusion and its associated regulatory challenges.

3.4 Sankey Flow Analysis

The Sankey diagram maps the flow from keywords (DE) to authors (AU) to countries (AU_CO). Fig. 7 below graphically represents the Sankey diagram from our data. As per the figure, author Gambacorta L. connects “Fintech” and “Financial Stability” with the UK and Switzerland.

Figure 7. Sankey Diagram



The diagram highlights geographic concentration of Fintech research in a few countries (e.g., UK, China, Germany) and a narrow band of keywords per author. A significant gap emerges in the under-representation of developing economies. The study finds that a research gap exists in studying the Fintech impact in countries like India, Bangladesh and Sub-Saharan Africa on financial deepening and informal credit.

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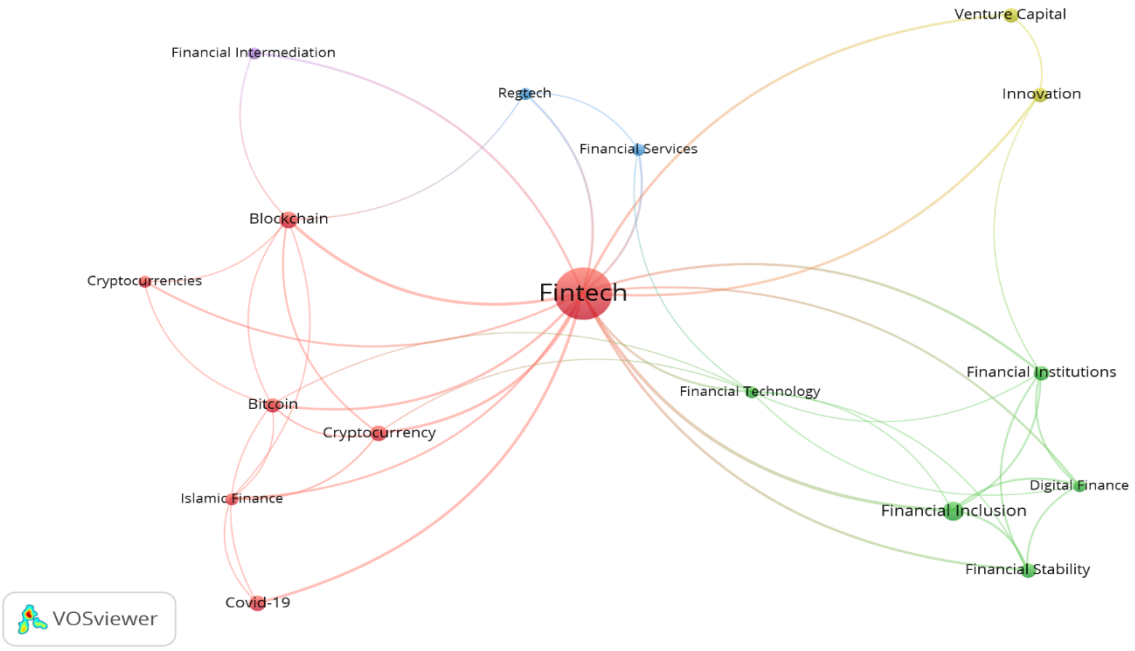
3.5 Co-Word Network Visualization and Trend Analysis

To further explore the structure of the domain, we created a keyword co-occurrence network with a minimum inclusion threshold of 3. This resulted in a total of 17 central keywords, with a total link strength of 104. To capture the trend analysis, we use all 220 keywords, with a total link strength of 995. Results are depicted in Figure 8 and Figure 9.

Figure 8. Keyword Co-occurrence Network Map



3.5.1 Network Interconnectivity

Figure 8 shows a network of co-occurring keywords. Keywords like “Blockchain”, “Bitcoin”, “Financial Intermediation” and “Financial Inclusion” are tightly linked to “Fintech,” forming interconnected research hubs. However, keywords like “Financial Intermediation” and “Digital Finance” are on the border of blockchain and crypto, suggesting that their integration in mainstream economics literature is still fragmented, highlighting a critical research gap and an opportunity to study the relationship between digital assets, intermediation mechanisms and systemic risk profiles in the Finance 4.0 era.

The trend analysis shown in Figure 9 indicates that the early literature exclusively focused on information asymmetry in P2P lending (Yan et al., 2015), competition in retail payments market (Jun & Yeo, 2016), Fintech development (Chen, 2016), Fintech impact on start-ups (Li et al.,

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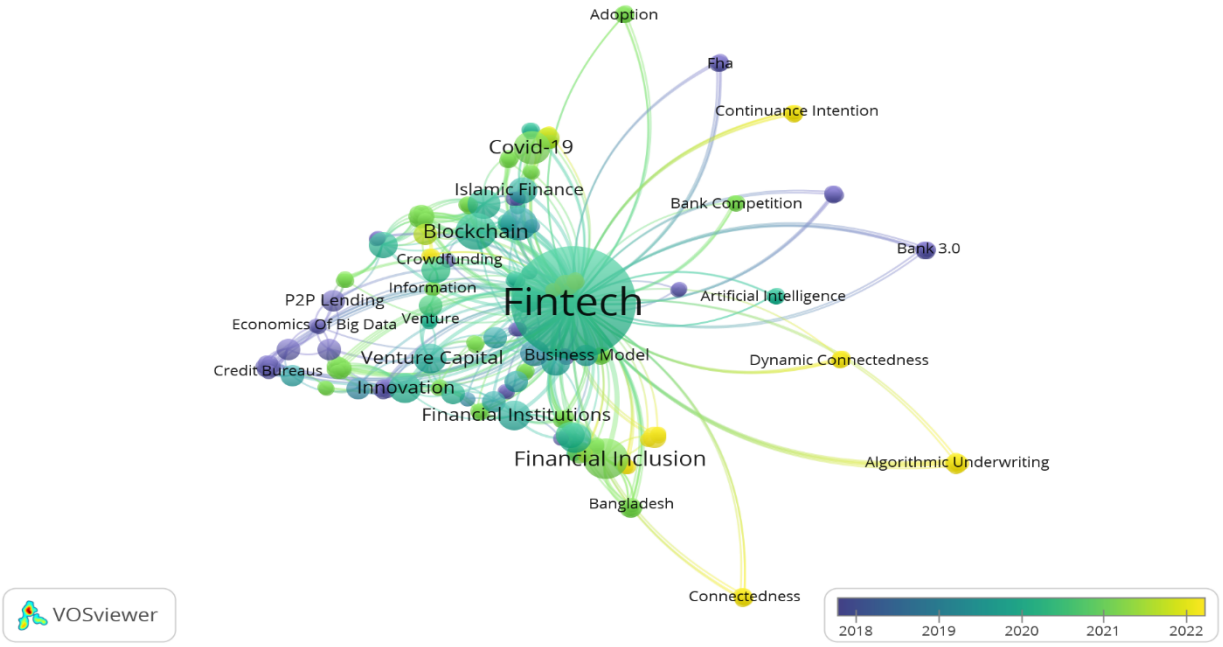
2017), enhancing financial inclusion (Loo, 2019), review on crowdfunding and blockchain (Cai, 2018), problems and possibilities in implementing Fintech innovative technologies (Saksonova & Kuzmina-Merlino, 2017), consumer oriented services (Gimpel et al., 2017) and InsurTech innovations (Stoeckli et al., 2018).

Figure 9. Temporal Keyword Co-occurrence Map



In contrast, recent literature emphasizes studying convergence of Fintech, ESG and renewable energy (El Khoury et al., 2023), behavioural intention to adopt Fintech services (Bajunaied et al., 2023), digital lending (Cornelli et al., 2023), Islamic banking (Rahman et al., 2023), financial inclusion (Gallego-Losada et al., 2023) and cryptocurrency indices (Shaik et al., 2023). This reflects a shift from descriptive adoption studies toward the strategic integration of technology and sustainability. As the industry moves toward Agentic AI, this evolution suggests that a nascent research stream will likely emerge around AI-driven green finance and autonomous regulatory compliance.

3.6 Qualitative Content Analysis and Theoretical Synthesis

To complement the quantitative analysis of the bibliometric mapping, the study also used a manual content analysis on a select corpus of 69 papers (comprising the 55 most-cited Scopus articles and a supplementary set of 14 non-Scopus sources). This synthesis reveals three primary streams that define the current intellectual landscape and provide the foundational evidence for proposed future research and direction:

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1. Adoption & Innovation

2. Market Impact & Inclusion

3. Regulation & Stability

Our keyword clustering revealed a dominant focus on early-stage adoption factors, terms like "diffusion", "user behaviour' and "perceived ease of use"; these together formed a cohesive cluster accounting. This aligns directly with Diffusion Theory, which puts forward that innovation spreads through market segments in a predictable S-curve: innovators, early adopters and so on. Indeed, Ozili (2018) documents how mobile banking penetration in Nigeria followed this pattern, with initial adopters concentrated in urban, high-income segments; it's a finding mirrored in our bibliometric network.

Studies following 2015 increasingly applied the TAM to Fintech adoption research, emphasizing - perceived usefulness and ease of use (Lee & Shin, 2018). Our bibliometric network shows a tight co-occurrence of these terms, validating that researchers have shifted from simply describing diffusion patterns to probing the drivers of adoption, which is a vital prerequisite for understanding the upcoming shift toward Agentic AI autonomous systems.

The bibliometric analysis also shows a surge in themes around financial inclusion, income distribution and economic growth, reflecting an academic movement toward the social and economic impacts of Fintech. This surge strongly resonates with Financial Intermediation Theory, which frames Fintech Platforms as alternative intermediaries that lower transaction costs and expand access to credit (Allen & Santomero, 1997). Empirical support for this exists in the work of Demir et al. (2020), who find that Fintech-driven financial inclusion reduces income inequality across a broad cross-country sample, with stronger effects in upper- and middle-income economics. Simultaneously, Inclusion Theory, which examines how financial innovations reduce exclusionary barriers, receives empirical support from Sioson and Kim (2019), who document a rise in women's account ownership following the agent-led models. These findings highlight how Fintech acts as a catalyst for economic development, though the black-box risks of AI-driven scoring models remain an emerging area of concern.

Our co-occurrence network identifies a robust cluster around regulatory arbitrage, alliances and systemic risk. This aligns with Regulatory Arbitrage Theory, which put forward that firms exploit cross-jurisdictional differences to optimize costs. Zetzsche et al. (2020) document how cross-border payment startups re-route transactions through lenient jurisdictions, reducing compliance costs. In parallel, Financial Intermediation Theory highlights the evolving roles of traditional banks; Boot and Marinc (2020) show that strategic alliances between Banks and Fintech firms have mitigated systemic risk by pooling liquidity and sharing compliance expertise during volatile market conditions. Understanding this arbitrage-versus-stability dynamic is essential as

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the industry matures into the Finance 4.0 era, where autonomous systems may further complicate cross-border oversight.

As shown in Table 6, we have mapped these three streams (Adoption & Innovation; Market Impact & Inclusion; Regulation & Stability) against the five fundamental theoretical frameworks. Our mapping reveals that while each theory finds strong support, the most productive advances occur at their intersections. Future research should develop models that capture these multi theoretical dynamics.

Table 6. Synthesis of Economic Theories and Empirical Findings across Bibliometric Themes

Research Stream	Theoretical Framework	Key Empirical & Bibliometric Support
Adoption & Innovation	Diffusion Theory	Early S-curve diffusion patterns identified in mobile banking (Ozili, 2018).
	TAM	Co-occurrence of perceived usefulness and ease of use constructs (Lee & Shin, 2018).
Market Impact & Inclusion	Financial Intermediation Theory	P2P lending platforms reducing transaction costs and expanding micro-credit (Demir et al., 2020).
	Inclusion Theory	Agent-led banking models successfully raising women's account ownership (Sioson and Kim, 2019).
Regulation & Stability	Regulatory Arbitrage Theory	Fintech platforms redefine intermediation by bypassing traditional structures (Omarini, 2020).
	Financial Intermediation Theory	Exploitation of cross-jurisdictional differences in payment services (Financial Stability Board, 2024)

4. Theory Support, Extension, and Contradictions

The following section evaluates how the synthesized research streams align with, extend, or contradict five foundational theories. By mapping bibliometric clusters to these theories, we identify the research gaps in present literature.

Diffusion Theory (Rogers, 1962) – Financial technologies do not spread across societies and industries in a linear way, as explained by Ozili (2018) using an S-curve in case of mobile banking. While the S-curve holds for early Fintech, the move toward Agentic AI may disrupt traditional diffusion patterns due to algorithmic readiness gaps. Future research must utilize longitudinal data

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to study late adoption in digitally immature markets and the underexplored role of social networks and influencers in driving trust in digital finance.

TAM (Davis, 1989) – Users adopt financial technologies based on perceived usefulness and ease of use. This theory is supported by the dense co-occurrence network of TAM constructs; however, current TAM research is overwhelmingly consumer centric. A critical gap exists in B2B Fintech contexts, such as how institutions adopt blockchain or Agentic AI systems. Furthermore, as systems become autonomous, the perceived ease of use construct may need to be replaced by perceived reliability to better capture user psychology in Finance 4.0.

Financial Intermediation Theory (Pyle, 1971) – Traditional banks act as intermediaries between savers and borrowers. It assesses how Fintech complements or displaces banks. This theory is supported by empirical studies demonstrating reduced intermediation costs and expanded credit access, but some clusters reveal Fintech platforms bypassing traditional intermediaries entirely suggesting a disruptive rather than complementary role. This challenges the theory's assumption of coexistence and calls for a revised model of Intermediation-less Finance where autonomous agents manage liquidity pools without centralized oversight.

Inclusion Theory (McKinley, 2010) – This theory highlights Fintech's role in reducing income inequality and enhancing access to financial services. It is supported by the rapid growth of women's and rural inclusion research; however, to remain relevant in the Agentic AI era, it must be broadened beyond financial barriers to include non-financial exclusions like digital literacy, education, and infrastructure. Without addressing algorithmic bias in AI credit scoring, Fintech risks creating new forms of systemic exclusion rather than development.

Regulatory Arbitrage (Riles, 2013) – Fintech firms operate differently across jurisdictions due to varying regulations. This theory is supported by cross-jurisdictional routing, but there is a notable lack of co-citation between arbitrage studies and systemic risk research. As autonomous finance scales, Arbitrage 2.0 could happen at machine speed, requiring a shift from static regulation to Real-time Algorithmic Governance.

4.1 Core Research Gaps and Directions for Future Research

The primary objective of this study is to identify the critical research gaps emerging from Fintech literature which must be studied by future studies as the financial industry moves towards Finance 4.0 and Agentic AI. By synthesizing the results from our thematic maps and review of the literature, we propose three priority research areas.

4.1.1 Fintech, Income Inequality and the Digital Divide 4.0

Fintech can curb inequality by enhancing financial inclusion, empowering lower-income groups, reducing transaction costs, developing financial products as it caters to the needs of diverse customer segments. This impact has been studied by employing a dynamic panel differential GMM

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in a study which found that Fintech contributes to curbing inequality, however, the effects were significant in regions with low-income inequality (Liu et al., 2023). Another study employed quantile regression analysis to understand the effects of Fintech on income inequality across countries. It concluded that Fintech reduces income inequality indirectly through its effect on financial inclusion, however the effects of financial inclusion on reducing inequality are majorly driven by upper-income group countries (Demir et al., 2020). A study of interaction between Fintech, financial inclusion and income inequality in a panel of 25 African countries suggests that policies enhancing Fintech development and financial inclusion play an important role in reducing income inequality (Chinoda & Mashamba, 2021). So, the current literature has studied the Fintech and income inequality, however in the age of Finance 4.0 and Agentic AI, it is important that following two research questions must be studied:

RQ1: How do varying regulatory practices, economic conditions and Fintech ecosystem maturities moderate the impact of Fintech development on income inequality in the age of Agentic AI?

The above question emerges directly from the five-dimensional analysis. From our co-authorship and citation mapping, we found that leading scholars' work is concentrated in regulatory contexts, while comparative studies across multiple regimes are absent pointing to an urgent need for cross-regime analyses. In the co-word dendrogram, "regulation," "economic development," and "ecosystem maturity" occupy distinct clusters apart from "inequality," revealing conceptual gaps that must be bridged in one integrated model. The thematic map placed "Income Inequality" in a low-density quadrant while "Regulation" and "Innovation" featured as well-developed themes, underscoring that inequality is under-theorized relative to policy structures. The co-word network showed thin ties between "inequality" and "regulation" signalling the need to strengthen those connections empirically. Finally, content analysis provides anecdotal evidence that favourable policy and robust digital finance infrastructures amplify inequality reduction, but no study has yet formalized these contextual moderators. Thus, this relationship warrants further investigation.

RQ2: What is the reverse effect of income inequality on financial inclusion and the uptake of autonomous financial services?

The above question fills the gap evident across all five-dimensions. In co-authorship and citation graphs, no research cluster has tackled the path from inequality back into inclusion, thus citations on inclusion uniformly assume Fintech led to Inclusion, never the reverse. The co-word dendrogram omits any branch linking "inequality" back to "financial inclusion," indicating a missing lexical pathway in the conceptual hierarchy. On the thematic map, "Financial Inclusion" reigns as a motor theme but is solely treated as an outcome of Fintech, while "Inequality" remains under-developed, highlighting the absence of a bidirectional framework. Our content analysis reveals that inclusion studies and inequality studies operate in largely conceptual silos, with few papers treating inequality as an antecedent of inclusion rather than an outcome, leaving the literature unidirectional. The co-word network visualization confirms a thick "Fintech-to-

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Inclusion" link and an "Inclusion-to-Inequality" link, yet the "Inequality-to-Inclusion" edge is virtually non-existent. Thus, it is vital to test the reverse effect of income inequality on financial inclusion mechanisms.

4.1.2 Fintech-Banking Alliances and Autonomous Intermediation

The effect of Fintech development on financial institutions and regulatory systems has been studied by many researchers. Utilizing expert-led insights and industry sources to study the development, present state and future potential of Fintech, a study concluded that problems faced by traditional banks can be easily resolved by Fintech firms with high-quality data and automation (Anagnostopoulos, 2018). Banks interact with Fintech start-ups in different ways, some banks collaborate with Fintech for product offering, some enter into licensing agreements, while others choose to either invest or acquire the Fintech firm. A study on the preferred form of alliance between bank and Fintech firms revealed that banks are more likely to form an alliance with Fintech start-ups when they have well-defined digital strategy (Hornuf et al., 2021). Fintech products have a substantial impact on commercial bank performance. A study conducted in China found that high levels of perceived usefulness of Fintech products bring higher customer satisfaction, which positively impacts banks' service quality and employee efficiency (Chen et al., 2021).

However, as the industry shifts toward Finance 4.0 and Agentic AI the nature of this partnership must be re-evaluated. Based on the above analysis following research questions are suggested for future study: - RQ1: What are the regulatory challenges posed by emerging technologies such as P2P lending, digital currencies and Agentic AI in the financial sector?

This question arises directly from the weak areas across all five dimensions. In our co-authorship & citation analysis, though the scholars focus broadly on Fintech's promise of credit explanation, regulatory scholars rarely collaborate with experts on P2P, crypto, and AI, revealing no integrated author clusters working on the regulatory aspect of emerging technologies. The co-word dendrogram places "regulation" in a separate branch from "P2P lending," "digital currency," and "machine learning," showing that the conceptual hierarchy has yet to work on policy and tech terms. On the thematic map, "Regulation" appears as a basic theme, whereas "Innovation," "Blockchain," and "AI" occupy niche quadrants; their separation indicates that regulation around these cutting-edge tools remains underdeveloped. Our literature review confirms that regulatory papers and technology-focused studies rarely engage with one another, so policy insights into tech domains remain under-explored. The co-word network visualization further highlights only thin ties between "regulation" and each of "P2P" and "crypto" underscoring the absence of an empirical link. Finally, the content analysis suggested scattered expert comments on compliance and risk but no systematic framework identifying the specific challenges these technologies pose. Together, these gaps make it clear that a dedicated, dimension specific research is needed to study regulatory challenges.

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RQ2: What is the long-term profitability and performance outcome of bank–Fintech alliances in a Finance 4.0 market?

In co-authorship & citation, researchers map how banks choose alliance forms, yet there is less development in the cluster tracing those alliances through to sustained financial metrics; thus, this reveals a clear disconnect between collaboration networks and performance analysis. The co-word dendrogram separates "bank–Fintech alliance" from "profitability," "service quality," and "efficiency," indicating that the methodological lexicon has not yet linked alliance structures to long-term outcomes. On the thematic map, alliances reside in a niche quadrant while "Financial Performance" is underdeveloped, highlighting that the durability of these partnerships has not matured into a well-connected theme. The co-word network visualization shows a strong "alliance led to customer satisfaction" link but a very weak "alliance led to long-term profitability" edge, signalling the need for a longitudinal perspective. Finally, our literature review finds that alliance studies and bank-performance research operate as largely separate research conversations: the former offers positive anecdotes about service quality and efficiency improvements, while very few studies systematically track risk-adjusted returns over time. Therefore, examining long-term performance outcomes in a Finance 4.0 market will directly address the neglected pathway connecting alliance formation to enduring financial value.

4.1.3 Role of Effective Regulation for Global Finance 4.0

Effective regulation plays a crucial role in Fintech platform development, which is why researchers across the globe study differences in regulatory practices. A study by Langley and Leyshon (2023) pinpointed the difference between regulatory approaches of the UK and China. While the UK promotes consumption and competition balanced with stability between Fintech start-ups, China adds restrictions on Fintech platforms to achieve economic growth and government control via algorithmic governance. While designing regulatory policies for Fintech, it is essential that regional inclusion goals are also considered, for instance, Indonesia used POJK 10/2022 and POJK 77/2016 for regulating Fintech, where POJK 10/2022 was introduced after POJK 77/2016 because it includes provisions for sharia compliant funding and offers stronger protections for users of Fintech lending services (Noor et al., 2023). Similarly, the issues and opportunities in regulating Fintech ventures at a global level have been examined (Maldonado, 2021); the research concluded that no single country serves as an ideal model, making international cooperation and dialogue among stakeholders essential for consumer protection, economic growth and financial ecosystem stability. Based on our analysis the following research question is suggested for future research:

RQ1: How can cross-national regulatory approaches be harmonized to manage the risks of Agentic AI while preserving regional inclusion goals?

In the co-authorship & citation network, regulatory scholars applied deep expertise within single jurisdictions but rarely collaborated across borders, highlighting a lack of truly comparative regulatory studies. The co-word dendrogram then shows "UK regulation," "China algorithmic

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governance," and "Indonesia POJK" forming distinct branches, rather than clustering under a unified "Fintech regulation" node, which signals that country specific frameworks remain conceptually segregated. On our thematic map, "Regulation" appears as a basic theme, yet its sub-themes are fragmented by geography, revealing an underdeveloped cross-national regulatory dialogue. Our literature review observes that regulatory papers in one regime rarely engage with those in another, with researchers in each jurisdiction drawing on distinct stakeholder reports and legal sources, indicating almost no cross-regime dialogue in the regulatory literature globally. The co-word network visualization further underscores this: the regulation-Fintech edge is strong within each country cluster but the UK-China-Indonesia inter country links are thin. Finally, content analysis suggests rich descriptive accounts of each country's approach but hardly any systematic framework comparing their underlying consumer protection trade-offs. Taken together, these findings make it clear that studying regulatory approaches to develop a systematic framework that addresses the underlying consumer-protection trade-offs inherent in global Finance 4.0 and Agentic AI.

5. Conclusion and Implications of the Study

This study integrates a multi-dimensional bibliometric analysis with a narrative review to synthesize the evolving landscape of Fintech literature. By adopting a hybrid methodology rather than a traditional systematic review, we have captured the rapidly evolving and interdisciplinary nature of a field currently moving toward Finance 4.0 and Agentic AI. This approach allowed for the inclusion of high impact working papers and conceptual frameworks that a rigid systematic search might have overlooked.

5.1 Summary

Our quantitative mapping of 318 Scopus-indexed articles (2015–2024), initially revealing four thematic clusters, was synthesized into three high-level streams: (1) Adoption & Innovation, (2) Market Impact & Inclusion and (3) Regulation & Stability. By conducting a qualitative deep dive into the 55 most-cited Scopus articles and 14 influential non-Scopus sources, we successfully linked these streams to five core economic theories: Diffusion Theory, TAM, Financial Intermediation Theory, Inclusion Theory, and Regulatory Arbitrage. The findings confirm that while the literature has traditionally focused on digital finance's contribution to inclusion and the competition between traditional and shadow banks, the field remains intellectually fragmented. Specifically, there is a notable research gap between tech-heavy research and socio-economic objectives such as income equality and regulatory policy frameworks.

5.2 Practical and Policy Implications

This study offers important implications for both policymakers and industry practitioners:

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For Regulators: The identified disconnect between technological innovation and policy frameworks underscores an urgent need for real-time algorithmic governance to manage the systemic risks of autonomous financial agents.

For Financial Institutions: Our findings suggest that the durability of bank-Fintech alliances will depend on moving beyond customer-satisfaction metrics toward long-term, risk-adjusted profitability in a volatile Finance 4.0 environment.

5.3 Limitations and Future Research Directions

While this study provides a comprehensive roadmap, it is limited by its focus on the Scopus database, English-language articles and predominantly Open Access sources. Supplementing the corpus with Web of Science data could have surfaced additional research gaps; however, that is beyond the scope of this study.

Future research should prioritize addressing the research questions we have raised in this study to bridge the divide between technological theory and practical implementation, so that the world economy can better navigate through the changing financial industry structure arising from Finance 4.0 and Agentic AI.

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Appendix A.1

Filters used for finding the relevant papers from Scopus

Category	**Criteria**	**No. of documents remained after each filtration process**
Query outcome before filtration	(“FinTech’ OR “Fintech”) - search string	10,314
Access type	Open	10,314 - 6,838 = 3,476
Subject area	Economics, Econometrics and Finance	3,476 - 2,091 = 1,385
Document type	Articles	1,385 – 218 = 1,167
Language	English	1,167 – 23 = 1,144
Publication stage	Final	1,144 – 26 = 1,118
Keyword	FinTech/Fintech	1,118 – 482 = 636
Years	2015-2024	636 – 174 = 462
Manual Filtration	After reading abstract and relevance to Fintech	462 - 144 = 318
Sample used for bibliography coupling and content analysis	More than 25 citations	318 - 263 = 55*

* Total articles used for literature review are 55 + 14 = 69

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Appendix A.2

Table 2. Descriptive Statistics of Selected Papers

Description	Results
Timeframe	2015-2024
Sources	143
Documents	318
Annual Growth Rate (%)	29.15
Average citations per document	19.82
Average citations per year and per document	4.471
References	17244
Document contents	
Keywords Plus (ID)	87
Author Keywords (DE)	955
Authors	
Authors Appearances	897
Author of single-authored documents	45
Author of multi-authored documents	773
Authors Collaboration	
Single-authored documents	47
Documents per Author	0.389
Co-Authors per Document	2.82
International co-authorships (%)	34.28

Figure 2. Evolution of the number of research articles published over time

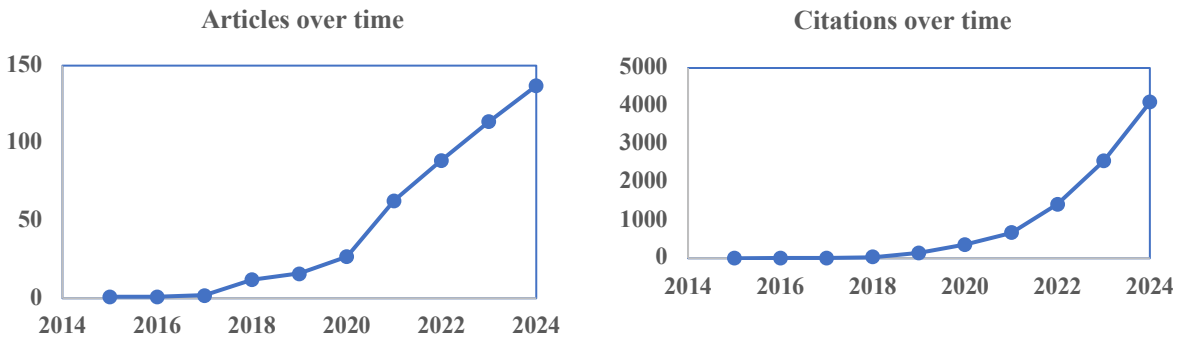

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Table 3. Compilation of Leading Top Journals in Research Sample

Sources	Articles	% of Total Sample	Publisher	Impact Factor	ABDC Rating
Financial Innovation	24	8%	Springer	8.4	
Journal of Risk and Financial Management	21	7%	Multidisciplinary Digital Publishing Institute (MDPI)	2.4	B
Journal of Open Innovation: Technology Market and Complexity	12	4%	Multidisciplinary Digital Publishing Institute (MDPI)	5.91	
Investment Management and Financial Innovations	8	3%	Business Perspectives Limited	1.02	B
Research in International Business and Finance	8	3%	Elsevier	6.5	B
Electronic Markets	7	2%	Springer	8.5	A
Finance Research Letters	7	2%	Elsevier	10.4	A
International Journal of Financial Studies	7	2%	Multidisciplinary Digital Publishing Institute (MDPI)	2.79	B
Risks	7	2%	Multidisciplinary Digital Publishing Institute (MDPI)	2.2	B
Cogent Economics and Finance	6	2%	Taylor & Francis	1.9	B

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Appendix A.3

Table 4. Compilation of leading manuscripts based on Citations

Authors	DOI	Total Citations	Total Citations Per Year
Ozili P. K.	10.1016/j.bir.2017.12.003	597	85.3
Buchak G. et al.	10.1016/j.jfineco.2018.03.011	457	65.3
Haddad C. et al.	10.1007/s11187-018-9991-x	292	48.7
Anagnostopoulos I.	10.1016/j.jeconbus.2018.07.003	229	32.7
Jagtiani J. et al.	10.1016/j.jeconbus.2018.03.001	183	26.1
Demir A. et al.	10.1080/1351847X.2020.1772335	165	55
Gimpel H. et al.	10.1007/s12525-017-0275-0	158	22.6
Cai C. W.	10.1111/acfi.12405	153	21.9
Zetzsche D. A. et al.	10.1093/jfr/fjaa010	121	24.2
Ozili P. K.	10.1080/07360932.2020.1715238	113	28.2

Table 5. Most Influential Authors in Fintech Domain

Authors	Articles	Authors	*Articles Fractionalized
Banna H.	4	Ozili P K	3
Grassi L.	4	Grassi L	1.83
Hornuf L.	4	Khan S	1.67
Khan S.	4	Hornuf L	1.58
Rupeika-Apoga R.	4	Broby D	1.5
Chen S.	3	Rupeika-Apoga	1.45
Dorfleitner G.	3	Banna H	1.42
Gambacorta L.	3	Li C	1.33
Giudici P.	3	Giudici P	1.17
Jagtiani J.	3	Jagtiani J	1.17

* $\text{Frac. Frequency}\left(\text{AU}_j\right) = \sum_{h \in \text{AU}_j} \frac{1}{\text{n. of Co-authors(h)}}$; where, AU_j is the set of papers written as Co-author by the contributor j and h is document included in AU_j

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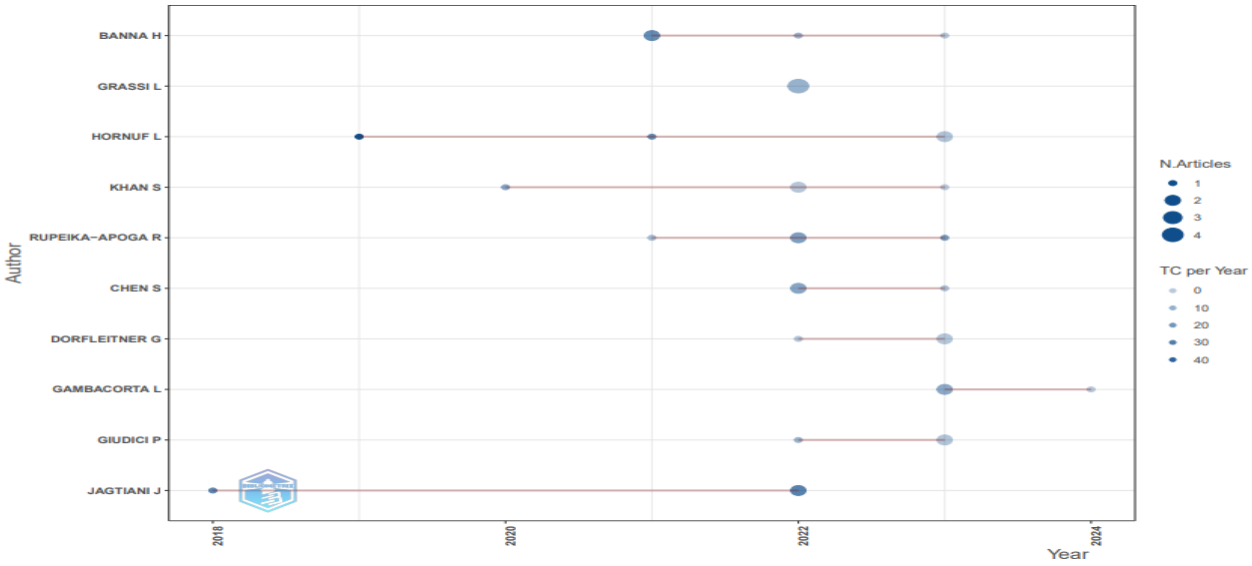
Figure 3. Authors Production Over Time



(The above figure graphically represents the work of top 10 authors on Fintech overtime)

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