Bibliometric Analysis of AI-driven FinTech Revolution: Mapping Global Trends, Thematic Evolution, and Future Directions

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ABSTRACT

The introduction of Artificial Intelligence (AI) to Financial Technology (FinTech) has revolutionised financial services by reshaping digital banking, risk assessment, and financial decision-making. This paper presents a bibliometric review of the intellectual landscape, thematic development, and academic influence of AI-based FinTech research published between 2012 and 2025. Using the PRISMA methodology, 978 articles from the Web of Science (WoS) database were analysed to identify research trends, collaboration patterns, and citation networks. Results show an immersive publication growth rate of 26.84%, indicating rising academic interest in AI-driven FinTech, with global collaboration accounting for 38.4%, as supported by an increase in international co-authorship in areas such as robo-advisory services and fraud detection. A notable surge in this research has occurred since 2021, particularly in the areas of big data analytics, conversational AI, and algorithmic risk management, accelerated by the rapid industry transformation of post COVID-19 pandemic. However, despite such advances, issues related to algorithmic bias, transparency,

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and cybersecurity risks remain persistent. This study presents a full map of AI-powered FinTech scholarly research, outlining research topics, trends, and perspectives of future research, offering valuable insights for scholars, policymakers, and industry champions to navigate the changing AI landscape of the financial services sector.

INTRODUCTION

The integration of AI into FinTech has fundamentally reshaped financial services, transforming digital banking delivery, risk management, and customer interaction (Lu et al., 2024; Mohsen et al., 2024). AI-embedded machine learning, big data analytics, and blockchain systems have enabled financial institutions to enhance operational efficiency, improve decision-making accuracy, and create more personalised customer experiences (Priyadarshana et al., 2024; Rane et al., 2023). Consequently, market dynamics are changing, whereby automated trading, predictive analytics, and customised wealth management are increasingly driven by intelligent systems that are superior in learning even from constantly changing financial information (Khurana, 2024; Pillai, 2023; Ouyang, 2024).

As AI adoption accelerates, scholarly attention has expanded beyond efficiency gains to encompass issues of AI regulation, ethics, and inclusion (Kumar et al., 2024; Nair et al., 2024). Nevertheless, existing studies remain fragmented across application domains such as digital banking, robo-advisory services, fraud detection, and financial risk assessment, which are often studied in disciplinary isolation (Barile et al., 2024; Rizinski et al., 2022). This fragmentation has limited cumulative understanding of how AI-driven FinTech research has evolved as a coherent intellectual field.

Prior bibliometric studies suggest that AI-FinTech research heightened following the COVID-19 pandemic, reflecting the rapid digitalisation of financial services (Zhang et al., 2023). During this period, the reliance on AI-based solutions intensified, corresponding to the heightened cybersecurity risks and the disruption of physical banking channels (Abdul-Rahim et al., 2022; Chang et al., 2024; Dawood et al., 2022; Piotrowski & Orzeszko, 2023). However, the intellectual gap persists, particularly the extent to which pre- and post-pandemic research trajectories differ in substantive directions (Zhang et al., 2023).

Using diverse theoretical perspectives, including technology acceptance models, innovation diffusion theory, and risk management frameworks to explain adoption and performance, inconsistencies in theoretical application and methodological approaches remain persistent. With limited cross-disciplinary integration, particularly in studies addressing financial inclusion, digital

banking transformation, and algorithmic bias (Andronie et al., 2023; Elia et al., 2023; Issa et al., 2023), the need for a systematic synthesis is worth exploring to clarify how theoretical and thematic strands intersect and evolve within AI-FinTech research.

Accordingly, with a comprehensive compilation of AI-FinTech studies and in-depth examination using bibliometric techniques and thematic evolution analysis, the study offers an interpretive account of how the field has progressed across pre- and post-COVID-19 periods. Rather than merely cataloguing publication trends, the paper elucidates how early research emphasising adoption, security, and model development has gradually shifted towards post-pandemic concerns related to value realisation, explainability, and governance. In doing so, the study contributes a structured synthesis of the intellectual trajectory of the AI-driven FinTech domain that informs future theoretical development, policy design, and industry practice. Specifically, the study is guided by the following research questions:

RQ1 : What are the key drivers of AI adoption within the FinTech sector?

RQ2 : How have AI applications within the FinTech sector evolved across the pre- and post-COVID-19 periods?

RQ3 : What are the dominant themes, emerging concepts, and theoretical lenses shaping AI-driven FinTech research?

Addressing these research questions will offer a data-driven overview of AI-driven

FinTech developments. The citation patterns and research partnerships provide a clear map of the dynamic state of AI integration in financial services, highlighting key technological trends shaping the financial ecosystems. The findings should promote interdisciplinary insights into the relevance of AI in transforming the financial industry. Additionally, beyond academic value, the study implies practical insights for financial institutions formulating digital innovation while managing risks and compliance standards within a highly uncertain market. Overall, the paper depicts a foundation for future research to navigate the sector advancement towards an intelligent, automated, and data-driven financial system.

METHODOLOGY

Bibliometric study provides effective methods for examining and visualising the information within published research in a specific academic domain (Dawood et al., 2022; Pop et al., 2024). It can discover research patterns, emerging trends, keyword frequency and relationships between key constructs. There are two visualisation categories: (1) bibliometric maps, and (2) bibliometric graphs. This paper utilises bibliometric graphs to convey research trends in AI-driven FinTech, as the latter provides more constructive information than maps (Van Raan, 2014).

The Web of Science (WoS) database was chosen as the primary data source instead of other alternative databases, such as Scopus, due to its rigorous journal selection criteria, providing quality and reliability assurance

in accessing high-impact peer-reviewed journals (Pranckute, 2021). WoS also offers advanced search and indexing features, supporting systematic data extraction, rigour, and quality of bibliometric analysis across interdisciplinary fields of social science studies such as finance, banking, and business economics (Aria & Cuccurullo, 2017).

Study Design

This study conducts a bibliometric study to trace the evolution of AI-FinTech research between 2012 and 2025. The objective is to determine the dominant thematic trends, intellectual frameworks, and research trajectories within the field. Using the PRISMA methodology, relevant documents were extracted from the Web of Science, resulting in a final dataset of 978 articles. The search string used for the document selection is presented in Table 1.

Justification of Data Source Selection

Web of Science was selected as the primary data source for this study due to its stringent journal selection criteria, citation indexing consistency, and strong coverage of high-impact journals across finance, information systems, and interdisciplinary social science research. As the objective of this study is to examine the intellectual structure and thematic evolution of AI-driven FinTech scholarship, the use of Web of Science enables a reliable assessment of influential works, citation networks, and longitudinal research trajectories. Although Scopus indexes a broader range of technical and conference-oriented publications, Web of Science is widely recognised as more suitable for bibliometric studies that prioritise research quality, citation integrity, and theoretical influence. Accordingly, the exclusive use of the Web of Science supports the study's aim of capturing the core scholarly discourse shaping AI-driven FinTech research while ensuring transparency and replicability.

Bibliometric Methodologies

Bibliometric analysis was carried out using R-Studio, Biblioshiny, and VOSviewer, focussing on citation networks, co-authorship network, and thematic clustering. While the systematic literature review (SLR) synthesised the key findings within

Table 1
The search string

Database	Search String
WoS	TS=(("FinTech" OR "Financial Technology" OR "Digital Banking" OR "Mobile Payment*" OR "E-Payment*" OR "Online Banking" OR "Electronic Banking" OR "Digital Wallet*") AND ("Artificial Intelligence" OR "AI-driven" OR "Machine Learning" OR "Deep Learning" OR "Big Data Analytics" OR "AI in Finance" OR "AI in Banking" OR "AI-powered FinTech" OR "Robo-advisory" OR "Financial Forecasting" OR "AI for Risk Management" OR "AI in Credit Scoring" OR "Chatbot*" OR "Conversational AI" OR "AI-driven Customer Service")

the research domain, the bibliometric technique provided quantitative insights on research evolution in terms of growth, collaboration, and emerging research domains. Thus, the integration of these two methodologies, as demonstrated in Figure 1, offers a comprehensive insight into understanding the development trajectory of AI-FinTech research.

Data Selection

The second stage involved data selection, where relevant manuscripts were systematically identified using VOSviewer and R-Studio. A thorough screening process ensured that only relevant articles that aligned with the study's scope were included. This process generated a .bib file, compiling the complete bibliographic data for subsequent bibliometric analysis. The article selection was performed within the framework of a high-quality systematic search strategy in the Web of Science database, selecting only the most relevant publications for this paper (Cao, 2022).

Data Analysis and Visualisation

The third stage focussed on data analysis and visualisation, using the R software and bibliometric tools to perform a descriptive bibliometric analysis of the selected manuscripts. Matrix tables were generated to categorise studies based on major themes, conceptual relationships, and intellectual
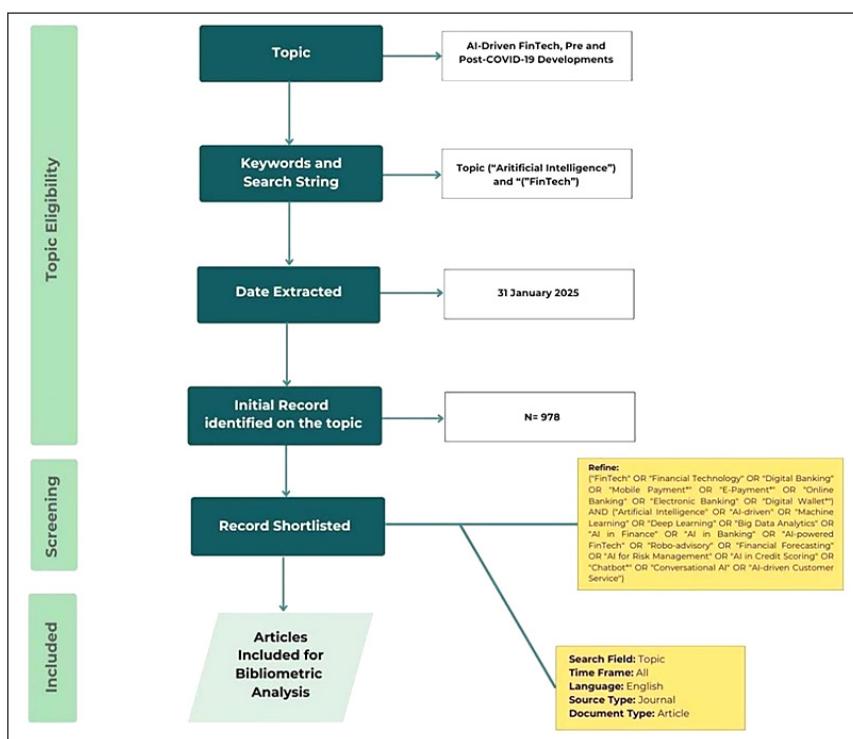

Figure 1. PRISMA technique

connections (Aria & Cuccurullo, 2017). Cluster networks and conceptual maps were then developed using Bibliophily, a web-based bibliometric tool to examine thematic linkages and intersections across literature. Data reduction techniques were used to visualise patterns while retaining structural complexity (Cobo et al., 2011; Donthu et al., 2021). This multi-layered method provided a clearer understanding of prevailing trends and the intellectual framework shaping AI-FinTech research.

Interpretation

The final stage involved interpreting the bibliometric findings to examine the evolution of AI-driven FinTech research. This step provided an overarching trend in scholarly output, institutional involvement, national contributions, and thematic clustering (Abramo & D'Angelo, 2011; Ismail et al., 2020). Interpretation was supported by several visualisation techniques such as descriptive bibliometric analysis, annual publication patterns, the Bradford law of identifying core sources, word clouds, tree maps, topic trends, authorship-country distributions, co-word networks, theoretical lenses, and cluster networks (Ahmad et al., 2024; Ha et al., 2025). Together, these analysis tools showcased a structured overview of the field's intellectual orientation, highlighting shifts not only in which knowledge structures and thematic priorities have changed over time but also offer an emerging direction that is likely to shape its future development.

RESULTS AND DISCUSSION

Descriptive Bibliometric Analysis

The descriptive bibliometric profile indicates that AI-driven FinTech has evolved into a consolidated and institutionally recognised research domain. Expanding publication output, increasingly interconnected authorship networks, rising citation trajectories and thematic diversification collectively signal a transition from exploratory experimentation towards cumulative and theory-informed knowledge production. As illustrated in Figure 2, the field is progressively characterised by empirical validation, methodological refinement and cross-disciplinary collaboration. This maturation aligns with the growing operational deployment of AI technologies in financial services, which continues to stimulate sustained academic engagement.

Research Growth and Annual Increase in Publications

The development of the number of publications per year (26.84%) reflects a strong and sustained research focus in the AI-FinTech domain. The increasing publication volumes are likely triggered by expanding AI applications and innovations in the financial sector. AI technology transmissions in digital banking, mobile payments, credit scoring, and fraud detection have been accelerated by the pandemic, changing industry demands for adaptive and innovative solutions and thus sought scholarly attention to keep pace with the challenging development.
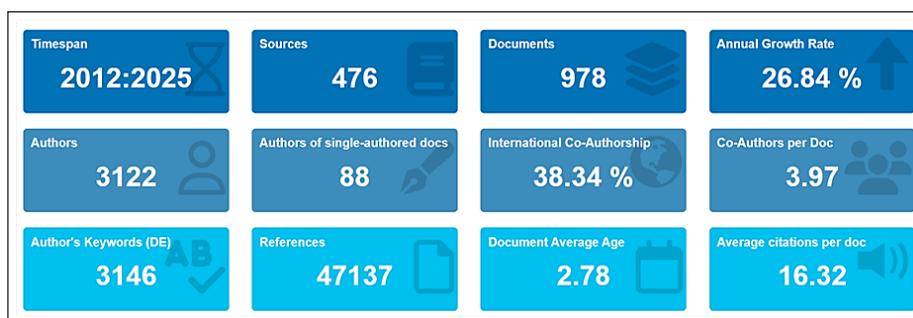
Figure 2. Descriptive bibliometric analysis

Global Collaboration and Network of Authors

International collaboration accounts for 38.34% publications, with an average of 3.97 co-authors per article. These figures indicate the global nature of AI-FinTech research, implying the shared recognition of AI's transformative potential across worldwide financial systems. It also assists in the production of a vast array of research centres and academic facilities in different parts of the world, which will enable maximum focus and exploration of AI and Financial contributions.

Authorial Impact and Citation Metrics

3,122 authors have made contributions to the field of AI-driven FinTech, showing that it is becoming an academic debate and acquiring a multidisciplinary nature. Out of this group, 88 authors have created solo work, meaning that research in the field is created in most cases in collaboration, often inter-institutional or inter-disciplinary. The citation score of 16.32 on average documents points to the scholarly contribution of the field, and the citation rate is rather high,

which supports not only the significance of the published works but also the suitability of AI applications in the financial services sector.

Document Average Age

The document average age of 2.78 years indicates the very recentness of the scholarship in AI-driven FinTech and relates to the speed of technological innovation taking place in the realm of artificial intelligence and the financial technology sector. Relatively young literature can be used to emphasise the acceleration of the discipline, with constant data science and algorithmic innovations bankrolling an active academic approach and a dynamic empirical aspect.

Key Trends and Thematic Focus

Author keywords and reference patterns identify major themes, including big data analytics, AI-based fraud detection, digital banking, and machine learning. More recent studies increasingly emphasise conversational AI and regulatory compliance, in response to post-pandemic

digitalisation and cybersecurity concerns. The thematic emphasis of conversational AI and regulatory compliance as a nascent trend shows a level of discourse maturity, given its connotation of more emphasis on the creation of technology stack constructs that provide data protection, counter cybersecurity threats, and enable individualised conversationally driven interactions with customers via smart financial services. Moreover, big data analytics has also received a lot of interest, especially in the contribution of AI to the improvement of financial decision-making. In the future of personalised financial services, including robo-advisory and automated trading systems, the rising significance of data-driven solutions in FinTech is pivotal.

References and Citation Analysis

The number of references used throughout the documents is 47,137, which demonstrates the wide academic network that AI-driven FinTech research uses. This extensive literature highlights the interdisciplinary character of the field, which relies on information obtained in the fields of computer science, economics, business, and regulatory studies. The variety of theoretical frameworks and methodologies used also reinforces the comprehensive approach that the field has towards the integration of AI in financial services.

Annual Scientific Production

The development and publication rate of annual scientific articles in the field of AI-driven FinTech is portrayed graphically from 2012 to 2024 in Figure 3. The acceleration of publication output after 2020 reflects more than a numerical increase; it signals a structural shift in research priorities driven by the pandemic-induced digitalisation of financial services. COVID-19 did not simply expand interest in AI-enabled finance but
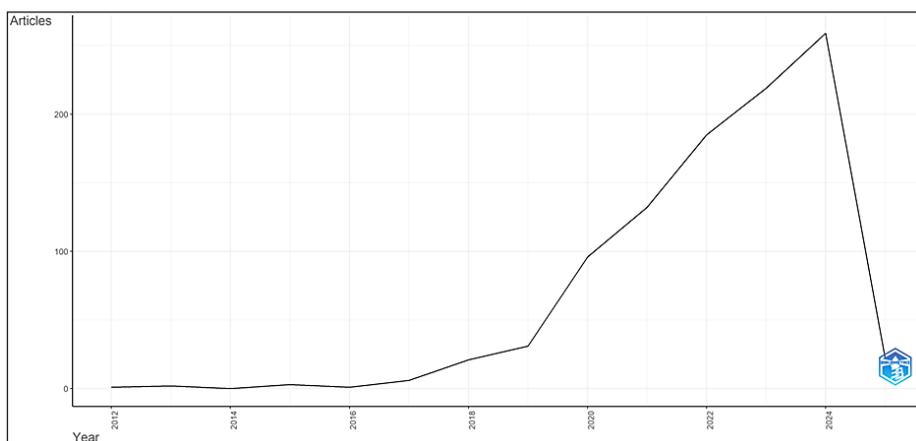

Figure 3. Annual scientific article production (Year 2012-2024)

altered the function of AI within financial systems—from experimental innovation to operational necessity. Consequently, research focus shifted towards applied problem-solving, including fraud analytics, automated risk assessment and digital service continuity, explaining the sharp post-2020 surge in scholarly output.

The upward trend in publications noticeably gained momentum since 2018, but the overall pace of the research output has grown exceptionally rapidly since the middle of 2020. The unprecedented expansion of scientific literature in the domain can be explained by the global necessity of rapid digitalisation caused by the COVID-19 pandemic. The crisis promoted the extensive application of AI technologies in the financial services sector, including digital banking and online finance, fraud detection, and algorithmic manufacturing of risk analysis. Thus, the analysed period captures the early academic response to post-pandemic disruptions in the financial sector.

Research by Fu et al. (2021, 2022) shows that the COVID-19 pandemic hastened the uptake of FinTech innovations, drawing attention to notable progress in AI-centred applications across the financial domain. While Fu and Mishra (2022) explore the part played by artificial intelligence in reinforcing banks' approaches to risk management during this period, focussing particularly on algorithmic assessment and fraud-detection processes. Together, these works illustrate how the disruption of the pandemic acted as a catalyst for the swift and adaptive incorporation of AI into financial services, as organisations sought to navigate operational pressures and rising security demands.

Finally, the graph shows a peak of publications around 2022, after which a minor decrease started in 2024. Once again, it is an incidental trend that can be explained by the over-productivity of recent years. In general, researchers in the field of AI-driven FinTech have achieved dramatic progress in terms of new approaches and technologies and lack the need to fill in the gaps with discoveries now. Future topics will probably include AI ethics, regulatory challenges, and the perspective of AI longevity in the context of the financial industry.

Three-Field-Plot

The relational patterns linking author affiliations, contributing countries and dominant keywords in AI-driven FinTech research are presented in Figure 4. The concentration of institutional and thematic linkages within a small group of countries reflects asymmetries in technological readiness, regulatory capacity and data infrastructure rather than uneven academic interest. China and India demonstrate strong alignment between institutional output and application-oriented keywords, suggesting the research in these contexts is closely integrated with large-scale digital finance initiatives. In contrast, the United States and United Kingdom indicate a more diversified research agenda, where AI is embedded within established financial systems.
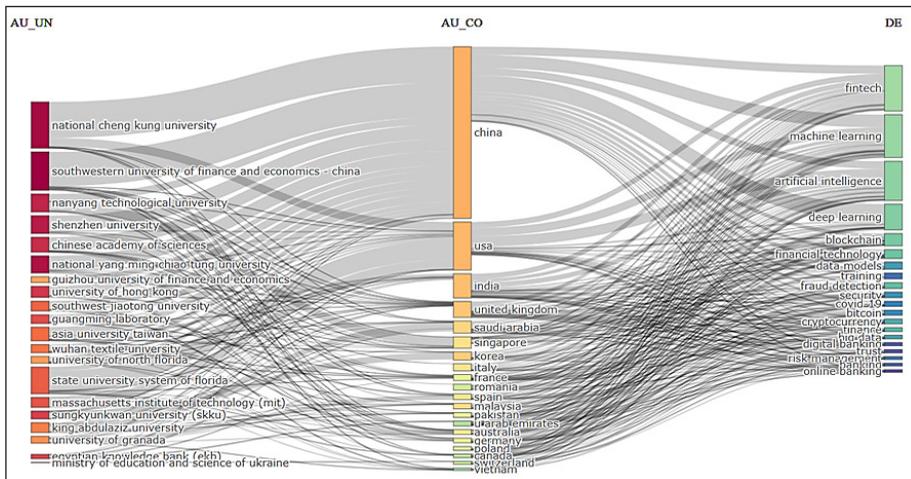
Figure 4. Three-field-plot (affiliation-country-keywords used by authors)

Keywords and Thematic Focus

The keyword plot highlights the dominant terms such as FinTech, machine learning, and artificial intelligence, confirming the research direction on enhancing financial service performance through advanced AI technology. Additional keywords, including blockchain, data mining, and fraud detection, indicate an increasing focus on security, risk management, and regulatory governance within digital finance. Together, these themes suggest a heightened emphasis on data governance, cybersecurity, and the development of personalised digital services.

Geographic and Thematic Trends

Geographically, China and India are highly associated with themes such as blockchain, digital banking, and cryptocurrency. This suggests priorities related to financial technology innovation and diffusion in emerging markets. Conversely, the USA

and United Kingdom plots are strongly linked to financial technology and machine learning, reflecting the integration of AI within established financial systems. The various thematic priorities across the regions are indicative of different infrastructure and readiness contexts.

Tree Map

The frequency distribution of keywords in AI-based FinTech research reveals the thematic priorities shaping the field's intellectual trajectory, as presented in Figure 5. Dominant terms such as model, impact, risk and artificial intelligence signal a strong emphasis on analytical modelling and performance evaluation. The prominence of these terms indicates a transition from feasibility-oriented experimentation towards evaluation-centred inquiry, where scholarly attention increasingly addresses the consequences of AI deployment rather than its technical novelty. This development
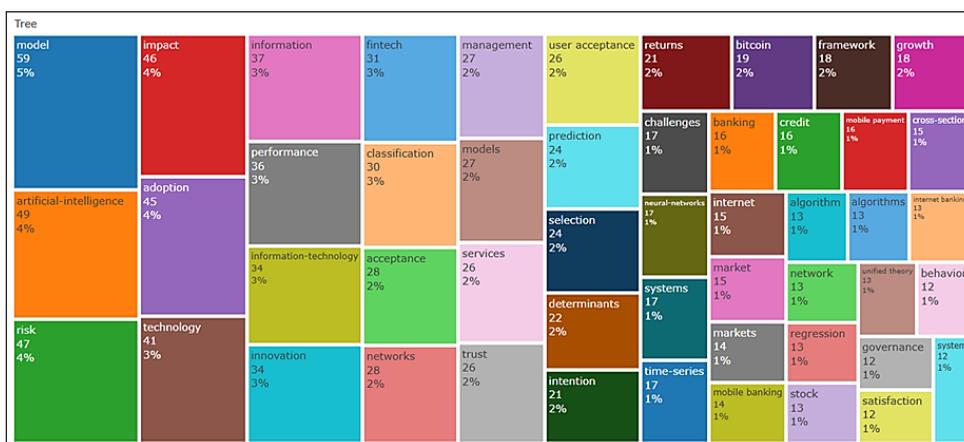
Figure 5. Tree map

reflects a reflexive phase in which performance optimisation, algorithmic accountability and regulatory governance are examined alongside predictive accuracy and automation efficiency.

The tree map also reflects the extent of issues in the field. Keywords such as adoption, technology, information technology, and fintech suggest a focus on the comprehension of the spread and adoption of AI technologies in the financial framework. While terms like user acceptance and trust are indicative of the significance of consumer trust in AI-enabled solutions, the focus on the societal and ethical aspects is still present. Other terms, such as performance, prediction, and selection, underline technical dimensions of the area, which are the enhancement of predictive accuracy, optimisation of decision-making, and choosing suitable algorithms. Overall, the treemap underscores the interdisciplinary nature of AI-based financial services, integrating technological, behavioural, managerial, and regulatory aspects.

Trend Topics

The temporal evolution of key terms in AI-driven FinTech research between 2020 and 2024 indicates a noticeable shift in thematic relevance, as presented in Figure 6. Terms such as prediction, growth and model show substantial increases, with model and artificial intelligence demonstrating steady escalation over time. The peak in predictive analytics observed in 2023 suggests heightened scholarly engagement by forecasting financial trends, risk assessment and customer behaviour modelling. This trajectory aligns with the expanding adoption of AI in risk management, personalised finance and algorithmic trading (El Hajj & Hammoud, 2023).

The temporal rise of predictive and impact-related terms reflects a maturing research agenda that prioritises outcome-oriented assessment over conceptual exploration. The increasing attention to adoption and information further suggests
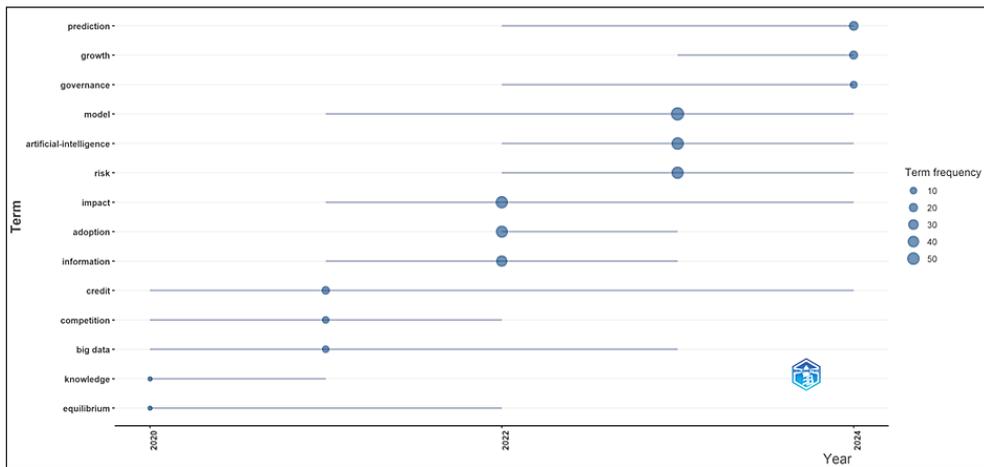
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Figure 6. Trend topics

that AI-driven FinTech research is responding to practical implementation challenges, including data governance, organisational readiness, and consumer trust. Together, these trends lead to a convergence between technological capability and institutional feasibility within contemporary FinTech scholarly work.

The rise of keywords such as big data, credit, and competition further underscores the competitive benefits that AI can bring to data analytics, customer segmentation, and credit scoring. Conversely, terms like equilibrium and knowledge exhibit less balanced patterns, which implies these directions are not the primary points of the recent AI-based FinTech studies, but they are still pertinent.

Thematic Mapping

The thematic positioning of AI-based FinTech research emerges from the density–centrality structure shown in Figure 7. This

density-centrality map offers a brief survey of the field, including research topics and already established ones, and provides a perspective on the current situation and maturation of AI-based FinTech studies.

In the Niche Themes quadrant, terms such as incremental learning, banking industry, and continuous learning seem to be emerging, yet are still in their early development phase within the AI-driven FinTech research. Keywords like adversarial attack and computer vision imply experimental, while relevant to AI development, yet to gain relevance and applicability to the FinTech industry. Accordingly, the field is a specialised area, targeted at very minimal application in scholarly FinTech research (Qiu et al., 2019; Voulodimos et al., 2018).

The Motor Themes quadrant includes highly focussed and developed topics such as deep learning, fraud detection, and cryptocurrency. These topics are
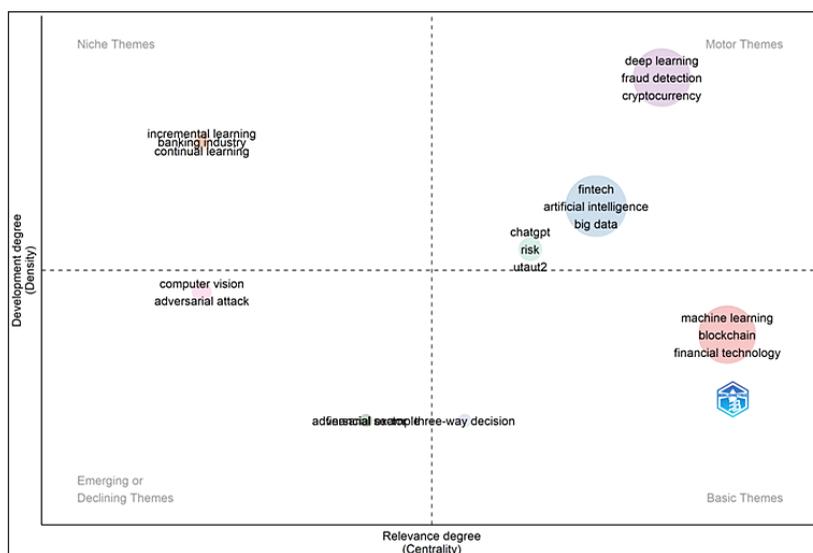
Figure 7. Thematic mapping

central forces behind the development of AI in Fintech, specifically as blockchain technologies become more popular and AI models are being used to detect real-time fraud monitoring. The use of the terms deep learning and fraud detection allows highlighting the focus of the industry on creating AI systems that could detect and prevent financial risks when they occur. The term cryptocurrency is used to indicate the increased attention to financial applications based on blockchains and the regulatory, security, and scaling problems they present (Corbet et al., 2019; Fischer & Krauss, 2018).

The Basic Themes quadrant includes foundational concepts, including machine learning, blockchain, and financial technology, which have a strong presence in the current AI-driven FinTech research and practice. These terms signify continued prominence in methodological and technological bases, as it reflects established research infrastructure that continues to be at the centre of AI-powered FinTech. The fact that they remain prominent and featured in the scholarly and industrial circles proves their continued relevance, and importantly, this research domain may have attained relative stability in addressing fundamental research questions.

Overall, the thematic map indicates a shift toward high-impact application segments like "fraud detection", "cryptocurrency", and "artificial intelligence" alongside close integration of AI with blockchain, machine learning, and big data analytics. As AI technologies have become more mature and widely deployed in the financial industry, this trend reflects the role of AI technologies as a strong mechanism to address complex, real-world challenges in financial systems (Odeyemi et al., 2024; Pillai, 2023; Rane et al., 2023).

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Cluster Network

The cluster network introduced in Figure 8 illustrates the interactions among key terms in the AI-driven FinTech research. Central nodes such as machine learning, artificial intelligence, and Fintech highlight the core development of the research field, as they show the great importance of AI technologies in changing the financial services industry. The dominance of Fintech, closely interrelated to terms like blockchain, cryptocurrency, and risk management, reflects the broad application of AI across digital transactions, digital assets, and financial risk analysis.

The central themes are surrounded by other clusters, which depict other specialised fields of AI in FinTech. A cluster that revolves around deep learning and fraud detection emphasises the increased role of sophisticated forms of AI models in detecting and preventing risks in real-time financial transactions. Strong links between

digital banking, online banking, and mobile payment indicate the role of AI-supported technologies in accelerating financial digitalisation. Additionally, the closeness of explainable AI and trust indicates the increasing focus on transparency, accountability, and ethical concerns in financial systems.

The links between big data, data mining, and cybersecurity further suggest the valuable role of data-driven models in AI frameworks in terms of using massive amounts of data to enhance the efficiency and safety of financial decision-making practices. The presence of the words robo-advisor, credit scoring, and digital finance indicates the potential practices related to AI in the sphere of financial advisors, credit analysis, and digital finance in general. This cluster network provides an overall perspective of how AI-based innovations are transforming various fronts within the financial industry, including the security of

Figure 8. Co-word net

transactions and customer confidence, as well as financial prediction and personalised services.

Thematic Evolution

Figure 9 shows the significant changes in AI-based FinTech research that can be observed in terms of two different periods: 2012-2020 (pre-COVID-19) and 2021-2025 (post-COVID-19). In 2012-2020, the literature focussed on the underlying themes, which were artificial intelligence, adoption, security, and model. These pioneering studies played a crucial role in indicating the possibilities of AI in the financial industry, and the effort was directed at theorising and analysing AI systems as financial tools. The focus on the term model represents the stage of the field development because the researchers tailored AI models to predictive analytics, fraud detection, as well as financial forecasting. Moreover, the long-term focus on the adoption and safety highlights long-term issues regarding the

introduction of AI into financial services, such as the organisational resistance to emerging technologies and the difficulty in providing efficient and safe digital financial services.

The thematic evolution observed across the pre- and post-COVID-19 periods illustrates a decisive shift from foundational modelling towards value realisation and accountability. While early research prioritised security, adoption and system design, post-pandemic scholarship increasingly focusses on returns, explainability and decentralised financial architectures. This transition reflects the normalisation of AI within financial infrastructures, where the central research challenge is no longer whether AI can be implemented, but how it can be deployed responsibly, profitably and transparently at scale.

The research of 2021-2025 changed to a more developed, practice-oriented topic. The term model still dominated,
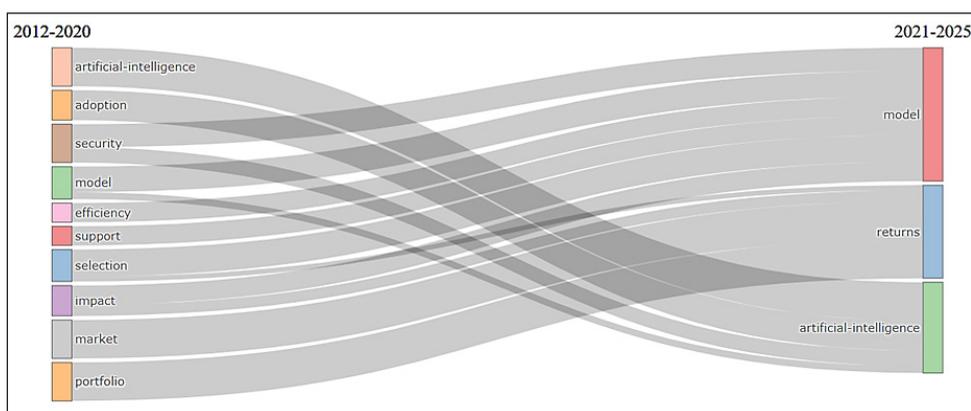

Figure 9. Thematic evolution

but the focus was expanded to refine the models to more targeted and high-impact financial applications. Interestingly enough, the concept of returns became one of the most represented ones, as the role of AI in delivering measurable financial results is becoming increasingly intertwined. This transformation is a transition toward theoretical advancement to a practical one, as AI models are currently used to streamline trading algorithms, optimise portfolio management, and advance financial decision-making. The emergence of returns as a major research topic is an indication that AI has ceased to be regarded just as a means of enhancing operations but has become one of the strategic resources that can produce a substantial amount of financial growth in financial markets.

The idea of artificial intelligence remained hegemonic in 2021-2025, albeit in a shifted set of circumstances. AI has not only been limited to research, but it has also become a key force in digital finance, and some technologies, such as blockchain, cryptocurrency, and explainable AI, are gaining traction. The overlap between blockchain and the emergence of interest in cryptocurrencies as the 2021 - 2025 trend is indicative of a more centalised priortisation of financial services, which has been accelerated by the digital acceleration of the pandemic. Also, explainable AI is used to reflect the trend in the industry towards making AI systems more transparent and accountable, as companies increasingly struggle with the increasing anxieties surrounding ethical implications and regulatory aspects of AI in finance.

The overwhelming research agenda in the field of artificial intelligence in financial services during the pre-pandemic decade (2012-2020) was concerned with the boost of security and operational efficiency. This set of priorities has come to lose its relevance over time in the post-COVID-19 environment, mostly since such abilities have been internalised in the technical and organisational architecture of AI-based financial systems. Instead of trying to gain basic research on these areas, modern research has focussed on optimising the use of AI in area-specific financial innovations, especially in fraud analytics, digital banking, and algorithmic credit evaluation. This shift is an indication that AI is no longer an emergent technology. It is now an essential field of research with the goal of maximising its utility to society, enhancing applied performance, and the creation of trustworthy, data-guided financial ecosystems.

Figure 9 shows that AI-based research in FinTech has significantly developed before 2020 and after 2021. The pre-pandemic emphasis on basic investigations and theory development has been replaced by the post-pandemic studies of practical outcomes and applications. The introduction of terms such as returns, blockchain, and explainable AI is an indication that the field of AI in finance is facing the very real concerns and opportunities it presents. This development signifies a more advanced and practical sphere, where AI technologies are not only transforming financial services but also creating measurable value across the business.

Analysis of the Emerging Themes from 2012 to 2020

The main new themes defining AI-driven FinTech studies in the period between 2012 and 2020 are depicted in Figure 10. The thematic structure shown in the figure represents an early stage of the evolution of the implementation of artificial intelligence in financial systems, where the focus of scholarship was mostly on the development of theoretical and methodological backgrounds. These initial research directions offered both conceptual and technical frameworks on which later post-pandemic studies have proceeded, making it possible to shift the exploratory development to applied and impact-based research in the financial world.

The Niche Themes quadrant includes phrases like support, stork, and network, which refer to research topics that continued to be marginal to the overall evolution of AI-powered FinTech research after 2020. It is reflected in their comparatively low density and centrality, implying limited conceptual development and ability to impact the wider research environment. It appears that these areas are early attempts to automate specialised financial tasks, like automating customer service or optimising the data network, as opposed to a fully-fledged research agenda. Even though these pioneering works led to the technical foundations of the discipline, these works failed to reach the scholarly exposure and spread of more central concepts like "artificial intelligence" and the model.

The Basic Themes quadrant demonstrates the significance of such terms as model, innovation, technology, and selection. These clusters have marked the stage of AI development in finance, when the academic focus was shifted to the creation and optimisation of core AI architectures to be used in practice. The main research activity at this time was to develop frameworks that could result in improved basic financial processes, such
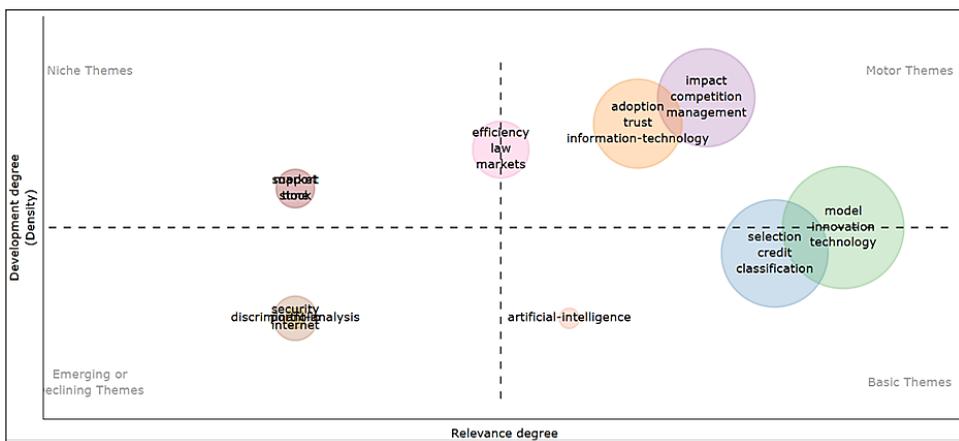

Figure 10. Emerging themes during 2012 - 2020

as credit scoring, risk management, and automated trading. The repetitive use of the word model highlights how the field is obsessed with the idea of creating adaptive and data-driven models that can meet the demands of finance in terms of analytical and predictive needs. At the same time, the focus of the concept of innovation and the term technology also indicates the key position of technological advancement in the process of forming the initial outlines of the AI-based FinTech ecosystem.

The quadrant of Motor Themes, which includes such terms as impact, competition, management, adoption, trust, and information technology, displays the shift in the field to the analysis of applied and organisational aspects of AI within the financial systems. These themes take a leading place in the development of AI-based FinTech, and this is the time when academic research started to focus more on the practical consequences of AI implementation in financial institutions and markets. The relevance of the terms adoption and trust between 2012 and 2020 demonstrates the increased interest among scholars in the behavioural and institutional determinants of the adoption of AI technologies. In the meantime, the focus on the impact and competition implies a similar change toward the realisation of how AI restructures the market, increases the competitive edge, and triggers innovation within the financial ecosystem.

The thematic relevance in this stage shows the appearance of such concepts as efficiency, law, as well as markets. The increasing importance of the concept of efficiency also throws more weight on a growing interest in using AI systems to optimise financial decision-making, streamline operations, and minimise institutional costs. The emergence of law is indicative of initial scholarly interest in the regulatory and ethical aspects of AI in financial practice, to which the term has since acquired significant momentum in the post-pandemic period. In the meantime, the focus given to the concept of markets demonstrates the increased popularity of the idea of an AI that can be used to improve the analytics of various markets and contribute to better predictive modeling and the reconstruction of financial market behaviour.

Analysis of the Emerging Themes from 2021-2025

The *Niche Themes* quadrant identifies authentication as a more and more topical field of investigation. This focus indicates the increasingly important concern regarding the safety of financial operations within the context in which digital banking and mobile payment systems have assumed a significant role in the daily economic process. With the institutions and consumers progressively increasing their dependence on digital platforms, the dependability of AI-based authentication systems has become a characterising research agenda. The word decision, which is contained in the Emerging or Declining Themes quadrant, indicates a differing trend. Decision-making models, once central to the study of AI in finance,

now play a less prominent role in the field, especially due to the development of algorithmic intelligence that have automated many evaluative processes that previously required theoretical modelling.

The quadrant of Basic Themes identifies the enduring core of centrality around the word model, a proof of the fact that AI frameworks are the pillars of financial services research and practice. What has started as conceptual work has slowly evolved into highly specialised tools employed to analyse risk, identify fraud, and predict market flow. The fact that the idea of risk still prevails in this group indicates that researchers remain in doubt as to how intelligent systems can transform financial stability, particularly in areas where algorithmic bias, data insecurity, and market instability converge. The repetition of the word impact narrates a similar tale: scientists are becoming more worried about the ways in which AI is changing the nature of judgement, affecting the ways in which institutions behave, and has effects on financial performance that can be quantified.

The quadrant of the most intense shift of academic interest after the pandemic is the Motor Themes one. The central themes include the concept of returns, the concept of bitcoin, and the concept of time-series, each of which is an indicator of the AI penetration into the structure of modern finance. The increasing focus on returns indicates the move towards quantifying actual financial returns of AI implementation in high-frequency trading settings and optimisation of portfolios. This emphasis shows an

industry that is relying more and more on the data-driven logic of investment as the role of intelligent algorithms increases in the production of yield. The prominence of the term bitcoin begs another change, with studies now investigating how AI and decentralised digital currencies are interacting, on transaction efficiency, valuation modelling, and how crypto assets should be governed. This trend is further enhanced by the focus on the methodological aspect of time-series analysis, whereby the asset-based forecasting tools provided by AI are re-forming market analytics, pre-empting price changes, and overall volatility and economic conditions.

The background influence of AI is not in any way over yet, and the current trend of research has artificial intelligence and adoption at the centre of focus. The popularity of the term artificial intelligence in this span is an indication that it is becoming a defining force, transforming the way financial systems are being run in terms of customer engagement and the architecture of backend infrastructures. Instead of being a process-enhancement tool, AI has turned out to be a strategic catalyst of innovation and organisational change. The above coverage of the topic of adoption indicates that both academics and professionals are becoming more worried about the challenges that impede the implementation of AI, such as regulatory ambiguity, organisational readiness, and consumer confidence. Even since 2021, one can see a certain change in the direction of the fact that these technologies should not

only be practical and profitable but also transparent and believable to both financial institutions and consumers.

To sum up, Figure 11 shows that the development of AI-driven FinTech research is marked by more advanced and application-specific research post 2021, where AI technologies are used to create a measurable financial value. The appearance of terms such as returns, bitcoin, time-series, and adoption indicate the development of AI applications and the further significant role of applying these technologies to the financial ecosystem. Additionally, the fact that the emphasis on the issue of risk and impact remains reminds us of the necessity to find a moderate path, when the benefits of AI are brought to fruition, with the consideration of its overall consequences on security, ethics, and regulation.

Theoretical Lenses

The theoretical lenses identified through co-citation and thematic analyses reflect

the dominant conceptual frameworks that have guided AI-driven FinTech research rather than serving as prescriptive models imposed a priori. These lenses, including technology adoption, innovation diffusion, risk management, and governance-oriented perspectives, emerge organically from patterns of scholarly engagement within the literature. Their identification enables an interpretive reading of how researchers have framed AI not only as a technical tool but also as a socio-technical phenomenon embedded within regulatory, organisational, and ethical contexts. By analysing the evolution and relative prominence of these lenses across time periods, the study provides insight into shifting epistemological priorities within the field, particularly the transition from efficiency-driven adoption studies towards governance, accountability, and explainability-oriented research in the post-pandemic phase.

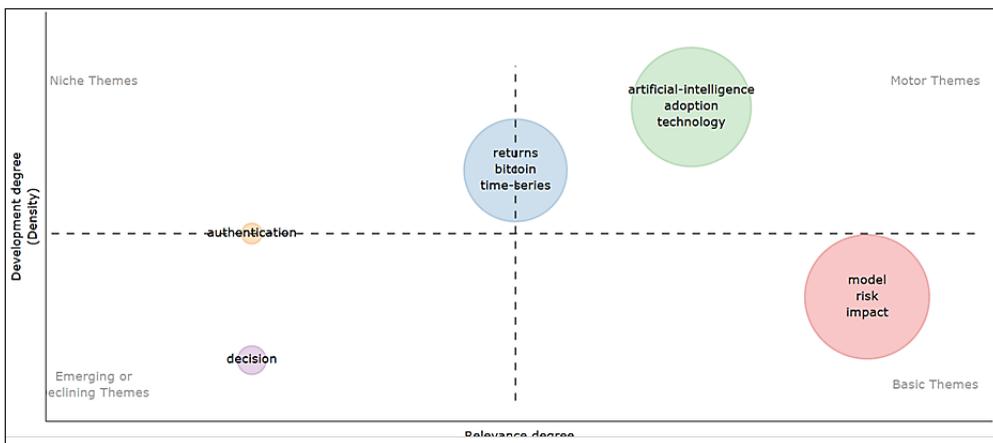AI-enabled FinTech is fundamentally interpreted under two major theoretical

Figure 11. Emerging themes during 2021-2025

frameworks, UTAUT and Commitment-Trust Theory. Every lens offers a useful perspective on the uptake, embedding and longevity of AI in financial services. These frameworks improve not only the conceptual clarity, but also inform design and implementation of AI solutions in the FinTech domain.

The unified theory of acceptance and use of technology (UTAUT) acts as a base model to understand factors that may influence the acceptance of AI-based FinTech solution. There are four main drivers of user behaviour, these being identified from the UTAUT model as performance expectancy, effort expectancy, social influence, and facilitating conditions. These considerations are essential for the adoption of FinTech tools like robo-advisors, predictive models, and decision-making applications. FinTech AI technology is built to remove all complexities, offering user-friendly solutions which are very similar to what the users expect, which encourages its utility. Performance expectancy, for example, focusses on the perceived benefits of AI tools in improving financial decision-making and effort expectancy is about the use simplicity of these technologies. Social influence and facilitating conditions further explain why societal and organisational pressures, as well as institutional support, affect the implementation of AI solutions. Hence, Figure 12 visually represents the interconnectedness of these factors, to demonstrate how adoption factors link in AI-Driven FinTech. Table 2 also presents the main constructs of UTAUT and their relevance to the FinTech context, given us

Figure 12. Unified theory network link visualisation

Table 2

Lenses on unified theory, key terms, and connections to AI

Theoretical Lens	Key Terms	Connections to AI/Fintech
Unified Theory	adoption	Key driver of technology adoption in AI-driven FinTech
Unified Theory	user acceptance	Critical factor influencing ease of adoption and use
Unified Theory	intention	Behavioural intention for continued usage
Unified Theory	UTAUT model	Framework for adoption factors in technology use
Unified Theory	determinants	Identifies key factors influencing adoption behaviour
Unified Theory	continuance intention	Explains sustained usage intentions in FinTech
Unified Theory	technology acceptance	Addresses user perceptions of ease and usefulness
Unified Theory	user experience	Focusses on enhancing the user-friendliness of FinTech tools

a well-rounded perspective on how does framework contribute to AI adoption.

Commitment–Trust Theory centres on the relational dynamics that sustain long-term user engagement with AI technologies in FinTech. The framework stresses that the relationships between financial institutions and clients are built on trust and commitment as the base contributing to long-term relationships. Trust, customer satisfaction, and service quality are the concepts to be considered in the central context of this theoretical lens. The trust is enhanced in FinTech applications, especially robo-advisory systems, through the presence of well-developed data security measures and transparency in algorithm design. According to Figure 13, consistency, personalisation, and transparency between the users and the service providers contribute to an enhanced relationship between them, which leads to increased loyalty of the customers. The theory also states that satisfaction and further use are determined by perceived value, which includes both functional and emotional dimensions of the value.

Table 3 summarises the key constructs of the Commitment-Trust Theory and describes how such trust-building processes should work in AI-based FinTech situations.

These theoretical approaches can be combined to provide a consistent basis for the analysis of the adoption and the long-term sustainability of AI technologies in the FinTech industry. UTAUT framework explains the behavioural and organisational variables that affect early adoptions, whereas the Commitment-Trust Theory is used to explain the relational processes that precondition continuity and loyalty in the long term. Taken together, they present a moderate context of how efficiency and trust are functioning as the twin forces in influencing user interaction with AI-supported financial applications. The combination of these thinking approaches elucidates how FinTech innovations combine technical usefulness with the relationship confidence to generate not only useful systems, but also believable systems in the eyes of end-users. The synthesis of concepts, which is backed by Figure 12
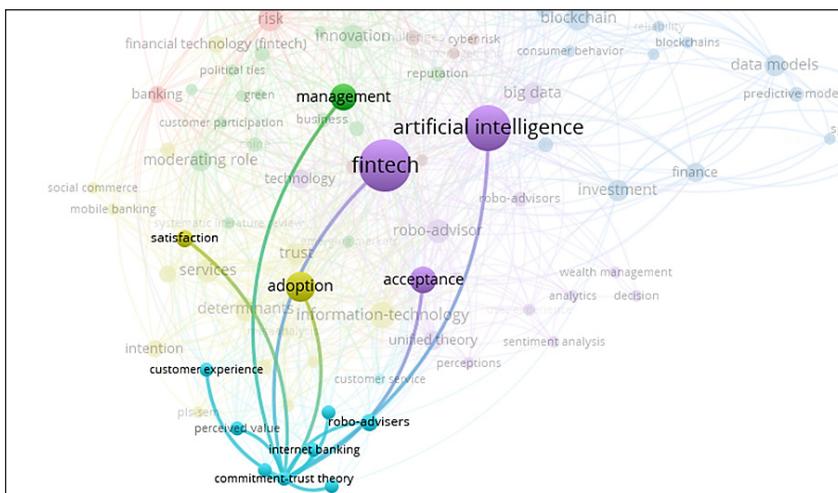
Figure 13. Commitment trust theory network link visualisation

Table 3

Theoretical lenses on commitment-trust theory, key terms, and connections to AI

Theoretical Lens	Key Terms	Connections to AI/Fintech
Commitment-Trust Theory	trust	Builds user confidence in FinTech services
Commitment-Trust Theory	advisor	Explains long-term trust and commitment in FinTech adoption
Commitment-Trust Theory	customer satisfaction	Measures satisfaction with AI-enhanced FinTech services
Commitment-Trust Theory	service quality	Highlights quality improvement through AI applications
Commitment-Trust Theory	perceived value	Assesses user-perceived benefits of AI in FinTech
Commitment-Trust Theory	customer experience	Focusses on improving user interactions through AI-driven personalisation
Commitment-Trust Theory	reliability	Ensures dependable FinTech operations via AI systems
Commitment-Trust Theory	transparency	Emphasises the need for clarity in AI-driven financial decisions

and 13 and summarised in Table 3 and Table 4, provides researchers and practitioners with the organised foundation of enhancing AI adoption strategies and maintaining user trust in the digital financial environment.

Interpretive Synthesis of Thematic Evolution

Beyond documenting shifts in dominant keywords and thematic clusters, the observed evolution of AI-driven FinTech

research reflects a deeper reorientation in how scholars conceptualise the role of AI within financial systems. Early studies predominantly framed AI as a technological enabler, focussing on adoption drivers, algorithmic performance, and system security within specific applications such as fraud detection and credit scoring. These contributions largely emphasised technical optimisation and efficiency gains, aligning with a problem-solving orientation rooted in information systems and quantitative finance. However, as AI technologies became increasingly embedded within financial infrastructures, particularly following the COVID-19 pandemic, scholarly attention expanded towards broader governance and socio-technical concerns.

Post-pandemic research exhibits a marked shift towards debates surrounding explainability, accountability, and regulatory oversight, signalling a growing recognition that AI in FinTech cannot be assessed solely through technical performance metrics. Instead, recent studies increasingly interrogate the ethical risks associated with opaque algorithms, data asymmetries, and potential exclusionary effects on vulnerable populations. This transition suggests that AI governance and ethical risk are no longer peripheral considerations but constitute a central intellectual backbone of the field. Accordingly, the thematic prominence of governance-oriented research reflects an evolving understanding of AI-driven FinTech as a socio-technical system in which technological design, regulatory frameworks, and organisational practices

are deeply intertwined. This interpretive shift highlights a maturation of the literature, moving from application-centric inquiry towards reflexive engagement with the long-term societal implications of AI-enabled financial innovation.

PRACTICAL IMPLICATIONS OF THE STUDY

Implications for Financial Institutions

The findings suggest that financial institutions are moving beyond exploratory experimentation with artificial intelligence towards operational integration across core FinTech functions. The prominence of themes related to fraud detection, credit risk modelling, and digital banking indicates that AI adoption is increasingly driven by performance optimisation and scalability considerations rather than technological novelty. Consequently, financial institutions are encouraged to prioritise governance-ready AI systems that balance predictive efficiency with transparency, particularly in consumer-facing applications where trust and explainability have become critical determinants of adoption.

Implications for Regulators and Policymakers

The thematic shift towards explainable AI, regulatory technology and accountability-oriented research reflects growing regulatory scrutiny over algorithmic decision-making in financial services. For policymakers, this evolution highlights the need to align regulatory frameworks with the pace of AI deployment, ensuring that innovation does

not outstrip oversight capacity. Regulatory sandboxes, adaptive compliance mechanisms and cross-jurisdictional coordination may therefore play an increasingly important role in facilitating responsible AI-driven FinTech development while mitigating systemic and ethical risks.

Implications for Technology Developers and FinTech Firms

For FinTech developers and technology providers, the observed transition towards value realisation and impact-oriented research underscores the importance of designing AI systems that are not only technically robust but also institutionally and socially acceptable. Emphasis on explainability, data governance, and interoperability suggests that future competitive advantage will depend on the ability to embed ethical safeguards and regulatory compliance within system architecture. Developers are thus encouraged to integrate design-for-governance principles early in the development lifecycle to enhance long-term adoption and sustainability.

LIMITATIONS AND FUTURE RESEARCH

Despite its contributions, this study is subject to several limitations that should be acknowledged. First, the bibliometric analysis is based exclusively on the Web of Science database. While Web of Science provides high-quality and curated coverage of peer-reviewed journals, this reliance may exclude relevant studies indexed in other databases, particularly technical

and conference-oriented research that is more commonly represented in alternative indexing platforms. As a result, the findings should be interpreted as reflecting dominant and established scholarly trends rather than the full breadth of AI-driven FinTech research activity.

Second, bibliometric techniques primarily capture structural patterns in publication output, citation networks and thematic co-occurrence, but do not directly assess the empirical quality or real-world effectiveness of the underlying studies. Consequently, the identified themes and trends represent intellectual prominence rather than evaluative judgments about methodological robustness or practical impact.

Building on these limitations, future research could extend the present analysis by incorporating multiple databases to provide a more comprehensive representation of interdisciplinary and technical contributions. In addition, qualitative synthesis and systematic review approaches may be employed to complement bibliometric mapping, allowing for deeper examination of causal mechanisms, governance challenges and ethical implications associated with AI deployment in financial services. Such efforts would further enrich understanding of how AI-driven FinTech evolves across regulatory, institutional, and societal contexts.

CONCLUSION

This paper gives a comprehensive review of the promising development path of AI-

enabled FinTech with key lines of research and narrative from 2019 to 2022. According to a systematic study and a bibliometric examination, it identifies the objects in which the technological advancement is most noticeable, such as the growing interest in predictive models, fraud detection systems, as well as artificial intelligence-enabled risk management systems after 2021. The report indicates that the COVID-19 pandemic was among the essential factors that stimulated digital transformation and that the implementation of AI in the financial sector has become a strategic priority among banks and regulators. The alteration noticed in the structure of the themes suggests that a shift in the basic research towards more applied research is taking place when transitioning between AI model development and adoption of new technology ideas, i.e., blockchain and cryptocurrencies.

Factorial Map and Dendrogram are the tools of analysis employed in this paper that prove the complicated interrelations between AI-driven FinTech themes. These tools show how initial stage themes, including "artificial intelligence" and "adoption" and "model" provided the basis of the field, and the pandemic led to the development of more sophisticated research themes, such as "returns", "bitcoin", and "predictive models", etc. In the wake of the 2021 period, AI has come out of its theoretical background to become an instrument with both financial implications, as online banking and blockchain applications are only some of the ways in which the financial

services industry has changed. This change of focus can be seen as a mark of a more developed and active industry, in which AI has already outgrown simple applications and is being used to fuel the growth of digital finance and decentralised systems.

The inferences also offer clues to significant participants in the AI-driven FinTech. Banks are seeking AI to simplify operations, reduce risk, and make superior decisions in the context of more complex market environments. It implies that regulators will be forced to design regulations that will be able to embrace these technologies and their adoption without necessarily leaving the playing field level. The challenge to developers of technology has been to develop systems that are long-lived, scalable, and transparent yet are also able to operate on all platforms, including the new generation of blockchain and cryptocurrency. Ethical issues of transparency, algorithmic discrimination, and privacy of data are still outstanding as well. The way of dealing with those issues will determine whether AI will be able to grow, become responsible, and gain sustainable legitimacy in the financial sector.

Finally, this paper will be valuable in its insights into the direction of AI-based FinTech research, its initial developmental phase, and the subsequent rapid pace of adoption and application during the post-pandemic period. The results support the idea that AI will influence the future of the financial sector and not only enhance the current financial infrastructure but also establish new disruptive technologies. Going

forward, further development of AI would entail the constant work of researchers, industry stakeholders, and policymakers to overcome the ethical, regulatory, and technological issues that will emerge in the future. The future of AI in FinTech looks like a continuation of the innovations where AI will be central in digitalising the financial services sector, making it efficient, convenient, and inclusive to all, no matter the location.

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