



New but naughty. The evolution of misconduct in FinTech

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ABSTRACT

The financial sector has undergone a significant transformation with the advent of financial technology (FinTech), which has put pressure on the business models of incumbents and has raised several concerns, including some related to instances of misbehavior. This article examines the existing body of literature on misconduct in the FinTech industry, encompassing a range of unethical behaviors, the underlying causes that contribute to such activities, and viable strategies to alleviate associated concerns. We employ a bibliometric and scientometric analysis, as well as topic modeling, a machine learning approach applied to natural language. Through a comprehensive examination of academic output, we highlight noteworthy patterns and promising areas of study.

We also discuss the possible advantages and disadvantages linked to the integration of developing technologies such as artificial intelligence and machine learning in the realm of fraud prevention and detection.

1. Introduction

The banking and financial sector has a long history of misconduct and unethical behavior, with scandals tarnishing the standing of conventional financial institutions. Examples include market manipulation, insider trading, mis-selling of financial products, money laundering, the Libor Scandal, and the Subprime Mortgage Crisis. This has led to public distrust and increased regulatory scrutiny. Financial market misconduct affects about 15 % of publicly listed companies annually, resulting in substantial fines for price, exchange rate, and interest rate manipulation that can severely impact an organization. Misconduct and fraud are prevalent across many financial firms, manifesting in various forms and involving multiple departments, making self-governance complex (Alexander & Cumming, 2020). FinTech has significantly transformed the financial sector by introducing innovative solutions that improve operational effectiveness, ease of access, and overall client satisfaction. The realm of financial technology encompasses a wide range of innovations, including digital payment systems, peer-to-peer lending platforms and robo-advisory services and its rapid expansion has streamlined transactions, promoted financial inclusivity, and broadened access to capital for individuals and businesses. Emerging digital lending methods are gaining traction, particularly in regions with favorable business environments, robust investor protection, efficient judicial systems, and well-developed bond and equity markets. FinTech and big tech credit appear to supplement existing credit forms rather than replace them (Cornelli et al., 2023). Disruptive innovations especially in

digital payments are occurring in a large number of countries around the world, which increases card-sales amount (Bounie & Camara, 2020).

In addition to these advantages, the everevolving and rapid nature of the FinTech industry has resulted in the emergence of novel dangers and concerns, with misbehavior emerging as a key issue. Misconduct within the realm of FinTech encompasses a wide range of unethical and unlawful behaviors, encompassing actions such as fraudulent acts, breaches of data security, unjust lending practices, manipulation of markets, and mishandling of consumer data. During the initial stages of rapid and dynamic technology development in the 1980s and 1990s, instances of financial fraud were very straightforward. The activities primarily involved in these fraudulent schemes encompassed the creation of counterfeit checks, the misappropriation of funds from individuals or investors through the establishment of fictitious companies, and the meticulous examination of loan paperwork, among other deceptive practices. Moreover, the growing use of technology in financial transactions has engendered novel prospects for malefactors to capitalize on weaknesses inside the system. The frequency of fraud has increased alongside the growing availability of new financial transaction methods, such as installment cards (Shilpa, 2023). The rapid development and ongoing progress of technology have introduced further complexities in the methods and strategies employed by fraudsters, resulting in potentially devastating outcomes (Beena et al., 2021). The occurrence of wrongdoing presents substantial risks to customers, investors, and the general stability of financial institutions as in the case of Indonesia with fraudulent schemes, breaches of data security, deceptive

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marketing methods, and failure to adhere to regulatory obligations or in the case of UK with digital payment providers accused of lax anti-money laundering controls, peer-to-peer lending platforms collapsing and on-line lenders engaging in deceptive practices, such as concealing fees and misrepresenting interest rates, resulting in financial hardships for borrowers. Failings include standard corporate governance shortcomings such as in the case of the FTX cryptocurrency exchange platform, which collapsed due to a liquidity crisis in November 2022 stemming from a series of accounting, administrative, and organizational irregularities. The owner used billions of dollars from the company's clients to finance the ultra-risky investments of his own trading firm.

As the FinTech sector experiences ongoing expansion and development, it becomes imperative to comprehend the scope and characteristics of unethical behavior and discern prospective avenues to improve stakeholder welfare protection. That is the main reason why due diligence is becoming a fundamental part of crowdfunding platforms. Background checks, site visits, credit checks, crosschecks, account monitoring, and third party proof are performed prior to funding. Platforms applying due diligence provide more services to protect issuers and investors. Furthermore, due diligence is associated with higher percentage of successful campaigns, more fund contributors, and larger amount of capital raised on platforms (Cumming et al., 2019). The FinTech sector has the potential to revolutionize finance, offering innovative solutions to millions worldwide. However, rapid growth and reliance on technology also exposes it to various forms of misconduct. As FinTech continues to reshape finance, addressing misconduct will be a critical aspect of maintaining public trust and sustaining industry growth. These emerging misconduct risks pose challenges for both regulators and FinTech players, requiring proactive measures to ensure ethical conduct and consumer protection. To confirm that, rules for market manipulation, insider trading, and broker–agency conflict, across countries and over time, are changing especially stock exchanges. Some of them have extremely detailed rules that explicitly prohibit specific manipulative practices, but others use less precise and broadly framed rules. On the other hand, differences in exchange trading rules, over time and across markets, significantly affect liquidity (Cumming et al., 2011).

After listing the main opportunities presented by FinTech and highlighting the current and potential threats that come from this disruptive innovation, this article focuses its attention on examining the existing body of literature on misconduct in the FinTech industry, encompassing a range of unethical behaviors, the underlying causes that contribute to such activities, and viable strategies to alleviate associated concerns through a comprehensive bibliometric, scientometric and topic modeling analysis of the existing literature on misconduct in this area. The aim is to analyze publishing patterns and temporal trends in this area, thereby enhancing understanding of the evolution and development of research on misbehavior in FinTech. Our analysis confirms how FinTech, while revolutionizing the financial industry, introduces new risks, including cybersecurity vulnerabilities and discriminatory algorithms, exacerbated by the rapid adoption and integration of cutting-edge technologies. The study has also identified a shift in the nature of financial fraud, driven by the complexity and anonymity afforded by digital platforms. Moreover, concerns over data privacy and the misuse of consumer data were underscored, affecting customer trust in the FinTech sector. The implementation of FinTech in the banking sector could potentially heighten the vulnerability and impact of systemic risks, particularly for regional banks, less profitable banks, and institutions in areas with limited FinTech development experience (Chen & Shen, 2024). With the main intention to shed light on the darker facets of the burgeoning FinTech industry this paper also contributes in providing evidence as a clarion call for more dynamic, informed, and technology-integrated approaches to curb financial misconduct, with the hope that, with the collaborations of financial actors, scholars and policymakers, we can build a FinTech ecosystem that is more secure and resilient, meets societal demands, and upholds the greatest standards of

honesty and responsibility.

2. Regulatory framework

The exponential expansion of the FinTech industry has surpassed the concurrent establishment of robust regulatory frameworks. It is difficult to strike the right balance between safeguarding customers and creating a regulatory environment that nurtures innovation. There is an evident trade-off for regulators and supervisors between proportionality on internal control systems aimed at not stifling innovation and their objectives of safeguarding customers and promoting financial stability. The aforementioned circumstances have resulted in deficiencies in the supervision and responsibility mechanisms, hence facilitating the occurrence of both undetected wrongdoing, as well as ascertained misconduct but lower or insufficient reimbursement in case of problems with or claims from. Ultimately, an overreliance on trust - built in other IT application sectors - may potentially facilitate fraudulent activities. Therefore, in the context of FinTech, the absence of robust regulatory and supervision mechanisms is expected to result in a higher likelihood of misbehavior. In regions characterized by elevated levels of crime syndicates and corruption, as well as limited government restrictions and the rule of law, the potential for fraudulent activities facilitated by FinTech services, including money laundering via cryptocurrencies, is likely to be heightened. A considerable number of FinTech firms exhibit a lack of expertise on the intricately regulated financial services sector. The absence of prior experience might FinTech has not only transformed traditional financial services but also revolutionized the regulatory and supervisory landscape. Regulatory Technology (RegTech) and Supervisory Technology (SupTech) are two critical subsets of FinTech that aim to streamline regulatory compliance and enhance supervisory processes in the financial industry.

2.1. Regulatory technology (RegTech)

Regulatory compliance is an essential component within the financial industry, since it ensures that financial institutions conform to the always changing regulatory obligations. RegTech is a term that encompasses the utilization of sophisticated technology, including artificial intelligence (AI), machine learning, and big data analytics, to streamline and mechanize the execution of compliance-related activities. Regulatory Technology, commonly known as RegTech, encompasses many crucial elements spanning from compliance automation and risk management (RegTech solutions streamline and automate the many compliance procedures, such as data collecting, reporting, and monitoring, with the aim of ensuring prompt and precise submission of regulatory requirements), to regulatory reporting (Regulatory Technology, RegTech). It optimizes the intricate and resource-demanding procedure of regulatory reporting resulting in decreased inaccuracies and the timely fulfillment of regulatory timelines). The adoption of RegTech solutions has proven beneficial for financial institutions, as it enhances efficiency, reduces compliance costs, and improves overall compliance accuracy.

2.2. Supervisory technology (SupTech)

The function of supervisory procedures is of utmost importance in the preservation of financial stability and the protection of consumer interests. SupTech refers to the utilization of cutting-edge technology by regulatory bodies to optimize and augment their supervisory functions. The primary characteristics of SupTech encompass data analytics and monitoring. SupTech utilizes data analytics tools to analyze extensive amounts of financial data, thereby facilitating the assessment of risks and the analysis of macroeconomic factors. This enables prompt responses to emerging risks through the application of machine learning algorithms, which identify patterns and trends that may indicate potential risks within financial institutions.

The integration of SupTech by regulatory authorities enables them to effectively align with technological improvements and take proactive measures in response to the dynamic financial environment.

3. Literature on misconduct in FinTech

Our main objective is to provide a comprehensive perspective on the existing body of knowledge about misconduct in FinTech which allows us not only to determine the misbehaviors in the FinTech field, but also to highlight which are the elements that, on the basis of studies already conducted, could constitute greater risk protection thanks to technology, compared to the traditional financial environment. This will facilitate scholars, policymakers, and industry professionals in acquiring useful insights into this crucial domain, hence informing future research endeavors.

Karpoff (2021) to figure out whether financial fraud is becoming a bigger or smaller problem over time, conducts a study which generates mixed inferences. In particular, focusing on the different factors that motivate fraud, using them to consider the impact of technological innovation, the findings identify changes which lead to an increase in anonymity in some financial transactions, facilitate new frauds and increase the possibility of fraud. Reurink (2018) posits that scholars have identified four key factors that have contributed to the occurrence of financial fraud in finance. Firstly, the financial industry has witnessed the emergence of new conflicts of interest and incentive structures that are inherently problematic. Secondly, there has been an influx of participants in the financial marketplace who lack sophistication and are easily deceived. Thirdly, the complexity of financial market transactions has increased due to rapid technological, legal, and financial advancements, as well as the availability of a wide range of financial products. Lastly, fund managers have increasingly employed justified secrecy by adopting trading models that are intentionally mystified and favour a completely passive stance by customers that leads to overreliance. Furthermore, Dzomire (2016) emphasizes a crucial element, stating that a significant number of banks do not contribute to customer awareness by failing to provide comprehensive information on internet banking fraud on their websites, disclosing under 50 % of recognized cases to the general public. While several banks provide online fraud information on their internet banking apps, the reliability and effectiveness of this information remains uncertain. This assertion posits that a significant portion of clients participate in internet banking transactions without an adequate understanding of potential internet hacks and assaults. Consequently, it is not unlikely that individuals who engage in financial transactions may fall victim to online fraud. According to Zakaria (2023), instances of fraudulent activities facilitated by FinTech can originate either internally within an organization due to inadequate internal controls or auditing mechanisms, or externally as a result of deficiencies in the regulatory framework. These deficiencies may encompass, but are not restricted to, inconsistent regulatory supervision, variations in cross-border regulations, and regulatory gaps. About regulatory challenges, one of the most important contributions, as a starting point, comes from Karpoff et al. (2008). Their study tracked the fortunes of all 2206 individuals identified as responsible parties for all 788 Securities and Exchange Commission and Department of Justice enforcement actions for financial misrepresentation from January 1, 1978 to September 30, 2006. Fully 93 % lost their jobs by the end of the regulatory enforcement period. Most were explicitly fired. The likelihood of ouster increases with the cost of the misconduct to shareholders and the quality of the firm's governance. Culpable managers also had substantial financial losses through restrictions on their future employment, their shareholdings in the firm, and SEC fines. A sizeable minority (28 %) faced criminal charges and penalties, including jail sentences that average 4.3 years. These results indicate that the individual perpetrators of financial misconduct face significant disciplinary action. A timeline to visualize the density of financial misbehavior, sees 2015 as a year particularly marked by a significant level of activity in the area of

developing financial technology (Zilgalvis, 2014) as well as instances of financial misconduct, fraudulent activities, and rising apprehensions about data security. 2014 instead was the year of the Mt. Gox scandal (which from 2013 until 2014 had handled over 70 % of all bitcoin transactions worldwide), the scandal of "Bitcoin Savings and Trust" (whose owner, in 2013, offered and sold BTCST investments over the Internet) and issues related to three major institutions, Deutsche Bank, Credit Suisse, and UBS (which admitted to being the subject of investigations conducted by the SEC on the mechanisms used in the dark pool).

4. Methodology

In order to enhance our understanding of the research landscape pertaining to misbehavior in the field of FinTech, this study adopts various methodologies that in our view are complementary: bibliometric and scientometric analyses and topic modeling. Bibliometrics, and its advanced application Scientometrics, is a quantitative approach employed to examine and assess the patterns and influence of academic publications, therefore furnishing significant insights into publishing trends, prominent authors, leading journals, and highly-cited works. It is aimed at understanding how scholars are shaping knowledge in a particular field. Topic modeling is a computational method in the field of natural language processing that uncovers the underlying theme organization in a collection of relevant texts, enabling us to discern the prevailing study subjects and growing domains of inquiry within a specific body of literature.

Our analysis entails a three-step procedure. Firstly, we conduct a comprehensive bibliometric analysis of the literature on misconduct in FinTech. The bibliometrix package in RStudio is utilized for the purpose of performing a statistical analysis on the literature. This study aims to evaluate the evolutionary patterns of the literature and reveal its conceptual framework through the utilization of a co-occurrence network. We explore these aspects mainly by analyzing publication trends, and citations. We also run a scientometric method, which involves the systematic analysis and measurement of scientific research and its subsequent impact. These two steps employ a range of metrics and statistical techniques to examine scientific literature, research outputs, and the interconnections among researchers, Countries, and organizations. Then, we conduct a topic modeling analysis to uncover the predominant themes and issues in the existing literature about misbehavior within the FinTech industry. This methodology further enables the identification of emerging areas of interest and potential research gaps within this specific field. The analysis utilized the Latent Dirichlet Allocation (LDA) technique in conjunction with the BERT algorithm, a Bidirectional Encoder Representations from Transformers, to examine the pre-processed dataset and identify prevalent topics.

4.1. Data

We select the ISI Web of Science (WoS), Dimension.ai and Scopus databases as scientific articles repositories.

We apply a rigorous protocol to preprocess the data about the information on the scientific articles to analyze to ensure data quality and consistency. The search query employed to get pertinent scholarly publications centered on misconduct within the FinTech industry and associated terminology. In order to assure the comparability of the results, our study focuses exclusively on articles written in the English language published in peer-reviewed journals that have gone through a rigorous assessment procedure, therefore eliminating novels, book chapters, conference proceedings, working papers, and other unpublished works. To avoid potential discrepancies, author names and affiliations were standardized. To ensure the substantive relevance of the prospective articles, we search for articles that contain within the abstract the combination of the terms "FinTech" and either "misconduct" or "manipulation" or "bribery" or "fraud" or "violation" or "false"

or "sanction" or "penalty". To ensure the relevance of the articles, all abstract must be read and specifically look for a discussion pertaining to misconduct in FinTech written in the article. This examination is conducted using the "fit for purpose" prism proposed by [Boaz and Ashby \(2003\)](#) and [Denyer et al. \(2008\)](#) aimed at assessing their substantive significance for a discourse pertaining to misconduct in FinTech.

A total of 60 unique documents were identified, without any duplicates.

5. Results

We have a final sample of 60 scientific manuscripts (articles, books, book chapters, conference papers) published between 2015 and 2023 in scientific peer-reviewed journals. The average citations per document is 8.9.

As FinTech disrupts the financial industry with innovative technologies and digital solutions, it also introduces new misconduct risks not only advancing the previous technologies used for traditional banking misconduct (e.g. unfair lending practices) but also related to new areas of concern (cybersecurity, privacy protection, algorithmic biases). Indeed, the reliance on digital infrastructure makes FinTech vulnerable to cyberattacks, compromising sensitive customer data and financial systems. FinTech, as an emerging industry, is a significant component of the digital economy, its business model overlaps with the banking business model. The digitalisation of banks themselves means banks also carry on FinTech businesses. In this context, many financial crimes have also been digitalised ([Huang et al., 2022](#)). Some online lending platforms have been known to engage in predatory lending practices, wherein they provide loans that involve undisclosed fees, exorbitant interest rates, and insufficient transparency in the loan terms. These methods take advantage of borrowers who are in a vulnerable position and have the potential to cause financial hardship. Online loan providers are financial institutions that offer their services through online platforms, utilizing information technology as a means of operation. When engaging in the process of credit application, a significant number of customers fail to take into account or demonstrate concern over the legal status of online lending organizations. According to [Subagiyo, Gestora and Sulistiyo, 2022](#), online loan providers that engage in illegal activities may face several forms of consequences, including administrative, criminal, and civil sanctions. Furthermore, [Bertsch et al. \(2020\)](#) identify a statistically and economically significant correlation between bank malfeasance and a rise in demand for online lending at both the state and county levels in the U.S. The findings of this study remain consistent even when accounting for the impact of bank credit supply shocks and are applicable to both wider and more specific measures of bank misbehavior.

The acquisition and utilization of extensive quantities of consumer data give rise to apprehensions over data privacy and the possibility for unauthorized exploitation of personal information. Certain FinTech organizations have the potential to engage in improper handling of consumer data, which may lead to unlawful actions such as unauthorized sharing of data with other entities or the exploitation of data for unethical purposes, including discriminatory lending practices. The inappropriate utilization of consumer data can lead to detrimental consequences for customers and a decline in trust in the FinTech sector. Financial service providers are responsible for managing and safeguarding extremely sensitive and confidential data, such as personal and financial information that is particularly valuable for cybercriminals, who actively seek to use it for illicit purposes.

The presence of a large number of users and stakeholders, coupled with numerous shortcomings regarding for example security, frequently result in vulnerability of FinTech to various threats and incidents ([Hossain et al., 2022](#)).

The utilization of algorithms in decision-making processes may result in discriminatory consequences, thus hindering the accessibility of financial services for specific demographic groups. Furthermore, the

utilization of algorithms and automation in the realm of trading may potentially be twisted to become market manipulation and insider trading. Unscrupulous individuals may misuse technology improvements in order to get unfair advantages inside financial markets.

To give some examples, we have the Mt. Gox scandal, which, from 2013 until 2014, handled over 70 % of all bitcoin transactions worldwide. Mt. Gox announced that about 850,000 bitcoins (worth 450 million dollars at the time) belonging to its customers and the company were no longer accessible or had been stolen. The shortage was actually due to a combination of theft, fraud, and mismanagement. Then we have the scandal of the Bitcoin platform "Bitcoin Savings and Trust" (2013), whose owner offered and sold BTCST investments over the Internet, raising more than 700,000 BTC in principal investments from BTCST investors, or more than 4.5 million dollars based on the daily average price of BTC when the BTCST investors purchased their BTCST investments. Shavers (the owner) falsely promised investors up to 7 % interest weekly based on BTCST's purported BTC market arbitrage activity, including selling BTC to individuals who wished to buy BTC "off the radar," quickly, or in large quantities. In reality, the BTCST offering was a sham and a Ponzi scheme whereby Shavers used new BTCST investors' BTC to pay the promised returns on outstanding BTCST investments and misappropriated BTCST investors' BTC for his personal use. Lastly, we have the issues related to three major institutions, Deutsche Bank, Credit Suisse, and UBS, which admitted to being the subject of investigations conducted by the SEC on the mechanisms used in the dark pool. In a few years, a transformation of the ways of order production and transmission had spread from the United States to the stock exchanges of the world, a practice known as High-Frequency Trading, or simply HFT, carried out by select circles of technologically gifted operators. The main feature was the astonishing speed that allowed competitive advantages on the order of milliseconds compared to other operators. Superfast computers, programs, and algorithms were responsible for "automatic" decisions triggered by pre-determined "market" conditions. Hence, the sending of a large number of orders in very short times, that is, at high frequency, for which human intervention was reduced to the programming phase.

5.1. Bibliometric analysis

The growth of research on misconduct in FinTech over time is examined through the analysis of publication counts and annual publication trends ([Fig. 1](#)).

There is a noticeable increase in the number of articles from around 2016, with a significant spike starting in 2021 and continuing sharply upward through 2022 and 2023. This suggests a growing interest and focus on FinTech within the research community, likely reflecting the industry's expansion and the emergence of new technologies and regulatory challenges.

The average citations per article show a peak around 2016, which may suggest that work published around that time was particularly influential or relevant to subsequent research. However, this peak is followed by a decline and subsequent fluctuations. The peak could represent a few highly cited articles influencing the average, or it could be that the topics covered during that year were of significant interest to the field.

The relatively low average citations per article in recent years (post-2017) might be due to the articles being too recent to have accrued a high number of citations. Citation counts typically grow over time as articles are discovered and referenced by new research.

The surge in the number of articles without a corresponding increase in the average citations could be indicative of a field that is rapidly expanding, with many new contributions that have not yet had time to be cited. Alternatively, it might suggest a saturation of the literature with many new articles not yet proving to be influential or seminal in the field.

The data shows a significant contribution from Asian countries, with

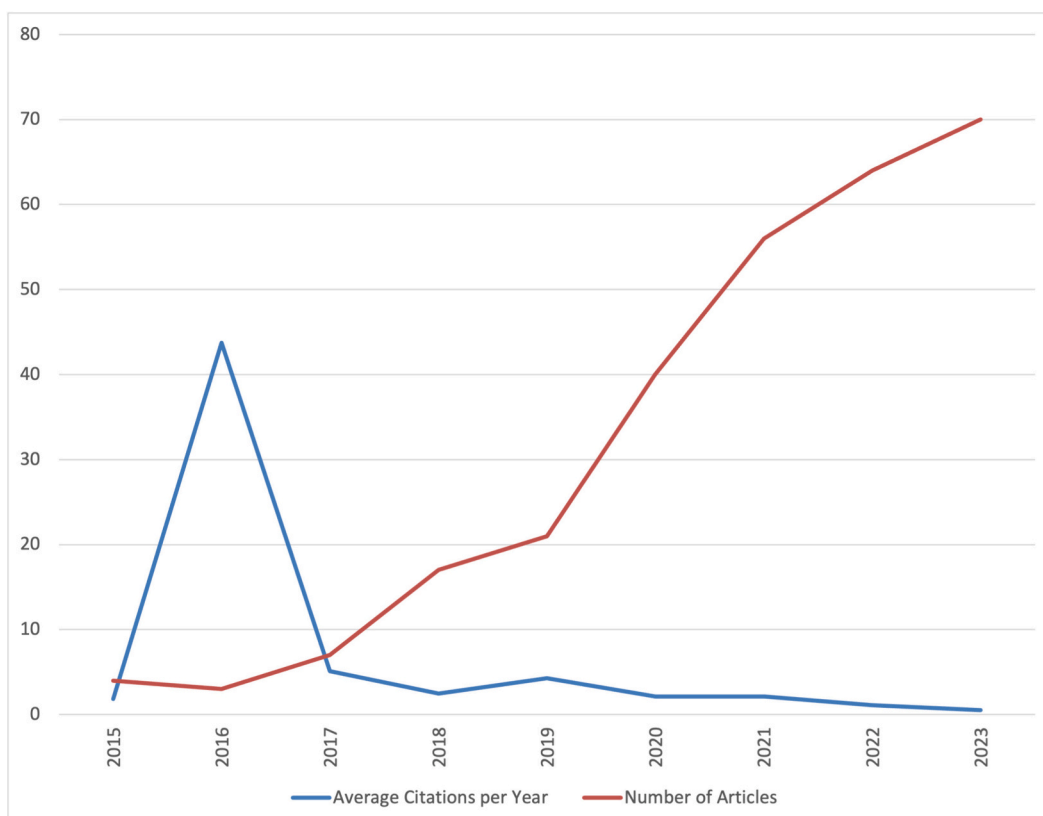


Fig. 1. Articles and Citations over Time.

China, India, and Malaysia collectively accounting for a substantial portion of the publications. This dominance could reflect the rapid growth and adoption of FinTech services in these regions, as well as a corresponding increase in academic interest and research output.

The USA and UK, traditional leaders in both financial services and academic research, show a strong presence in this field as well. Their contributions could be driven by advanced technological development, mature financial markets, and a robust academic infrastructure.

Furthermore, in the United Kingdom, there have been several cases of misconduct in the FinTech industry that have raised concerns about consumer protection and market integrity. One significant case involved a digital payment provider that faced accusations of lax anti-money laundering controls, leading to the facilitation of illicit transactions. As a consequence, the company was subject to substantial fines and regulatory scrutiny. Another notable instance revolved around a peer-to-peer lending platform that collapsed, leaving investors with significant financial losses due to inadequate risk assessment and transparency issues. Additionally, certain online lenders were found to have engaged in deceptive practices, such as concealing fees and misrepresenting interest rates, resulting in financial hardships for borrowers. These real-life cases highlight the importance of robust regulatory frameworks and oversight in the FinTech sector to ensure ethical conduct, safeguard consumers' interests, and maintain public trust in the rapidly evolving digital financial services landscape in the UK.

Countries like Australia, and Italy, though not leading, still have significant contributions. This diversity indicates a global recognition of the importance of studying FinTech misconduct.

Similar to other fast expanding and dynamic industries, incidents of wrongdoing might arise within the Indonesian FinTech sector. Various types of misbehavior commonly observed including fraudulent schemes, breaches of data security, deceptive marketing methods, and failure to adhere to regulatory obligations. In order to tackle these concerns, regulatory bodies in Indonesia have been proactively overseeing the

FinTech industry and implementing measures against businesses proven to be involved in unethical practices. In order to safeguard consumer interests and uphold the integrity of the financial technology sector, regulatory authorities have implemented measures such as the imposition of fines, cancellation of licenses, and other penalties (Subagiyo, Gestora and Sulistiyo, 2022).

5.2. Scientometric analysis

We identify emerging research areas and trends by analyzing publication patterns and the frequency of the topic in the literature. Fig. 2 and Fig. 3 show respectively the word clouds of uni-grams and bi-grams in the abstracts of the articles. The word cloud presented in Fig. 2 captures the multifaceted landscape of FinTech, centering around the pivotal concepts of "risk" and "data", which are indicative of the primary concerns within the industry—data security, privacy, and risk management. There is a pronounced emphasis on the "regulatory" challenges faced by "banks" and other "banking" institutions as they navigate the complexities introduced by digital transformation. This transformation,



Fig. 2. Word Cloud of bi-grams in Abstract.

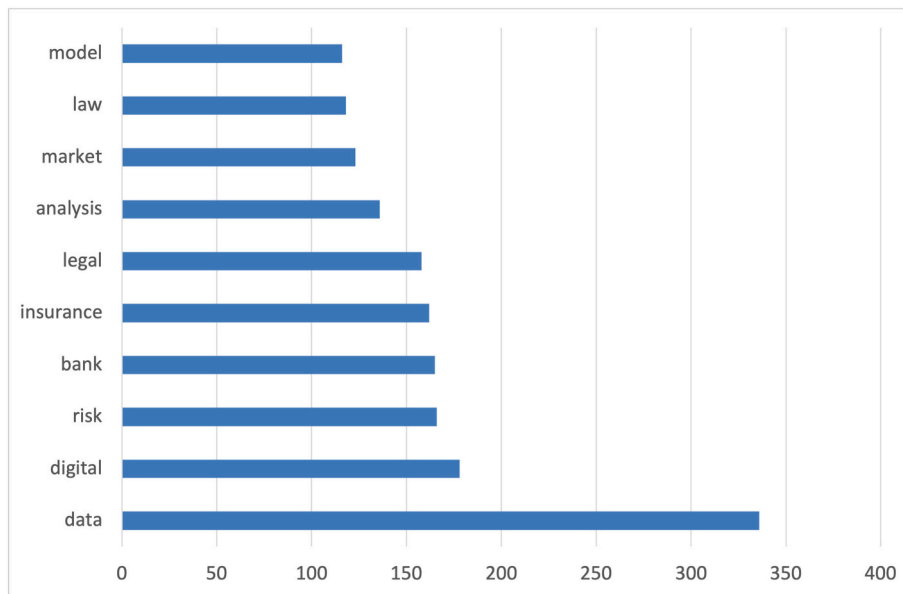


Fig. 4. Most Frequent uni-grams in Abstract.

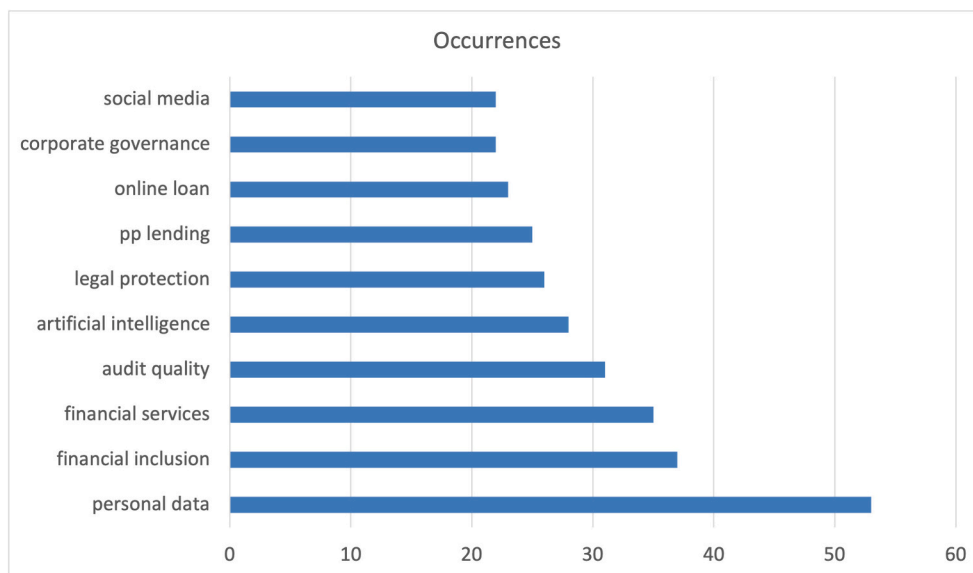


Fig. 5. Most Frequent bi-grams in Abstract.

metrics and the interpretability of the resulting topics. Multiple rounds were conducted using varying quantities of subjects in order to determine the most effective arrangement that yielded significant and logically connected themes.

The K-means clustering algorithm is employed to detect groupings of papers that exhibit shared themes. Using topic modeling analysis has facilitated the identification of five distinct clusters, each representing a specific observed subject. Through this method, we have seen the presence of comparable terms among our reference articles, suggesting interconnections among these topics.

Fig. 6 is a thematic map, also known as a strategic diagram, used in bibliometric analysis to categorize and evaluate the relative importance and development of research themes within a specific field. This type of visualization helps to identify the maturity and centrality of research topics in the literature.

The map is divided into four quadrants:

- *Upper Right - Motor Themes*: These are well-developed and central themes within the field. They are considered to be the driving force of the research area. Terms like "artificial intelligence", "financial institutions", and "financial crisis" suggest that these are established, core topics in FinTech research that continue to be significant and influential.
- *Upper Left - Niche Themes*: These themes are well-developed but not as central to the field. They might represent specialized areas of research that are significant but perhaps not as widely influential across the field as a whole.
- *Lower Right - Basic Themes*: These are fundamental to the field but not yet fully developed. They are central and emerging, indicating potential growth areas in the research. Terms like "financial services", "legal protection", and "personal data" suggest foundational aspects of FinTech that are gaining traction in current research, possibly due to their increasing relevance in practice.

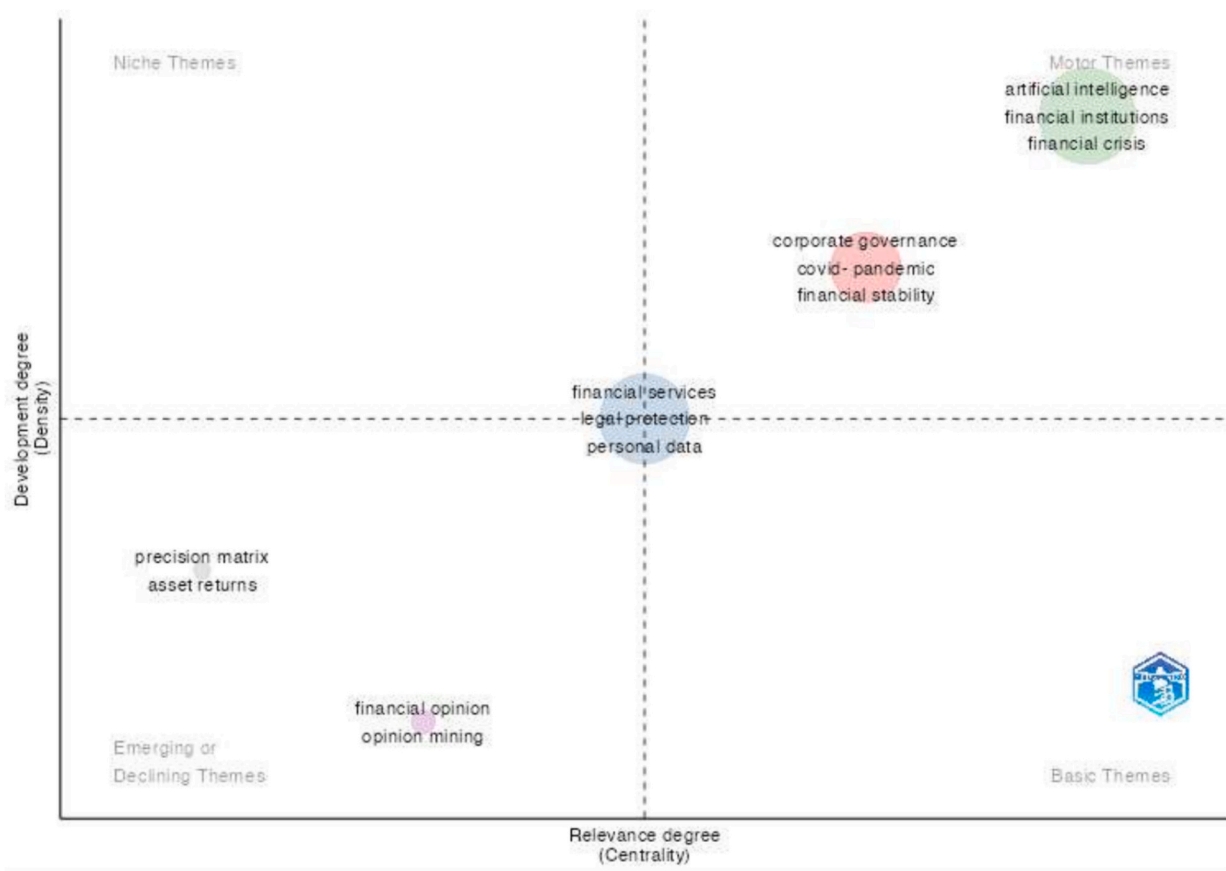


Fig. 6. Co-word analysis results.

- **Lower Left - Emerging or Declining Themes:** These themes are neither well-developed nor central. They could represent either new areas that are starting to gain attention ("emerging") or areas that are losing relevance and receding in importance ("declining").

The positioning of terms like "corporate governance", "COVID-pandemic", and "financial stability" near the center suggests these topics are currently of balanced importance and development in FinTech research. Their centrality indicates they are interconnected with many other research areas, while their degree of development suggests they are established but still evolving fields of study.

The "precision matrix" and "asset returns" in the bottom left indicate that these might be niche or waning in focus within the current research landscape, while "financial opinion" and "opinion mining" seem to be less developed but potentially on the rise as new areas of interest.

Overall, this thematic map provides a snapshot of the research landscape, identifying key areas of focus and their stages of development, which is invaluable for researchers looking to understand the evolution of the FinTech field and identify gaps or emerging trends in the literature.

Indeed, the cluster analysis in Table 1 provides a structured overview of centrality metrics across various research themes within the FinTech sector. The clusters identified include Corporate Governance, Financial Services, Artificial Intelligence, Financial Opinion, and Precision Matrix, each scored across three different centrality measures. Corporate Governance exhibits a substantial degree of influence within the research network, with an average betweenness centrality of 119.120, indicating its role as a bridge between disparate topics. Financial Services, with an average betweenness centrality of 132.591 and the highest PageRank centrality of 0.400 %, emerges as a pivotal theme, suggesting its content is frequently referenced within the network,

Table 1 Cluster analysis results.

Cluster	AVG btw centrality	AVG clos centrality	AVG pagerank centrality
Corporate Governance	119.120	0.209 %	0.322 %
Financial Services	132.591	0.204 %	0.400 %
Artificial Intelligence	171.159	0.231 %	0.572 %
Financial Opinion	0.187	0.159 %	0.140 %
Precision Matrix	-	50.000 %	0.410 %
Total	147,708	0.746 %	0.474 %

denoting significant influence.

Artificial Intelligence stands out as the most central and influential cluster, scoring the highest across all centrality measures, pointing to its dominant role in FinTech research discourse. In contrast, Financial Opinion represents the least central theme, with the lowest scores, potentially indicating a more specialized or emerging field within the broader FinTech research landscape. The Precision Matrix cluster, lacking data for betweenness centrality and showing an anomalously high closeness centrality of 50.000 %, may be indicative of an outlier or an emerging theme of growing relevance. Collectively, these centrality metrics, culminating in a total average betweenness centrality of 147,708 and average closeness and PageRank centralities of 0.746 % and 0.474 %, respectively, illustrate the dynamic interplay and varying degrees of maturation and centrality among the themes within FinTech research.

6.1. Corporate governance

The "Corporate Governance" cluster presents a collection of research titles that explore various dimensions of corporate governance in the context of FinTech and digital economy. These titles range from specific legal cases to broader conceptual explorations, underscoring the consequences of corporate misdeeds.

Several papers delve into the risks and regulatory challenges introduced by digitization. The cluster also contains research on new financing methods, highlighting the evolving nature of corporate financing in the digital age.

Archival studies within the cluster offer empirical insights into the mechanisms of corporate accountability and the role of external audit functions. Issues of consumer protection and financial stability are also prominent, with works examining the legal and economic implications of FinTech innovations and crisis responses.

Furthermore, the cluster encapsulates the multifaceted impact of FinTech on corporate governance, ranging from operational risks and legal challenges to the strategic adaptation of governance models in response to technological advances and financial crises. This collection reflects a comprehensive scholarly effort to understand and navigate the complex interplay between corporate governance practices and the disruptive forces of FinTech.

6.2. Financial services

The "Financial Services" cluster comprises a robust array of research papers delving into the legal nuances, risks, and transformative potential of FinTech within the financial sector, particularly with a focus on Indonesia's burgeoning Islamic FinTech landscape. The titles suggest a comprehensive examination of FinTech from a legal perspective, addressing the prospects and challenges of Islamic FinTech, the scrutiny of borrower screening on FinTech platforms, and the darker aspects of FinTech as perceived by developers.

Legal ramifications are a recurring theme, with studies on illegal peer-to-peer (P2P) lending as declared by Indonesia's Financial Services Authority (OJK) and the consumer protection laws safeguarding against the mishandling of personal data in online financial transactions. The impact of the COVID-19 pandemic on legal protections for creditors in information technology-based lending services is also explored, alongside the potential of FinTech P2P lending as an alternative financing model for micro, small, and medium-sized enterprises (MSMEs) in Indonesia.

Several papers investigate the criminal liabilities associated with online money lending, the misuse of personal identity in online loans, and the legal consequences of defaulting on digital financial agreements. Additionally, the cluster includes analyses of the legal framework governing FinTech and the specific risks of personal data theft in online loan applications.

Nonetheless, the technological progressions brought about by FinTech can reduce risk exposure. FinTech can realize the whole process of risk coverage, including expanding risk information acquisition, building a customer-centered panoramic view of risk, and intelligently identifying potential risk points and transmission paths in the ex-ante period. FinTech can strengthen risk measurement capacity, model development, and feature extraction, and realize dynamic capture and intelligent early warning of high-risk transactions and abnormal and suspicious transactions. Once risk is identified, digital means can be used for automated transaction interception, account freezing, vulnerability remediation, and other countermeasures (Wang et al., 2023).

Emerging themes such as the management of financial opinions, the integration of technology into financial regulation, and the governance challenges posed by blockchain and digital currencies are also represented. Papers discuss the application of innovative technologies like brain-computer interfaces (BCIs) in financial governance, scrutinizing the appropriateness of the sandbox approach for new models of BCI

governance.

In sum, the "Financial Services" cluster reflects an intricate interplay between FinTech innovation and the legal frameworks designed to regulate and protect stakeholders within this dynamic ecosystem. It encapsulates the evolving discourse on FinTech, touching upon issues of legality, ethics, and risk management in a digital economy, with a notable focus on the adaptation of Islamic financial principles in the context of modern technological advancements.

6.3. Artificial intelligence

The array of titles associated with the "Artificial Intelligence" cluster from the dataset presents a compelling narrative of the AI's multifaceted impact on the FinTech sector. The papers cover a spectrum of topics: from a systematic review of blockchain technologies and their transformative capabilities to the intricacies of InsurTech innovations. They delve into how big data affects information asymmetry in P2P lending and the principles behind designing hybrid intelligence systems for business model validation. The collection reflects a deep dive into the prediction models for SME default, suggesting a rethinking of traditional approaches and the necessity to revise AI lifecycle models in the context of FinTech.

Significantly, these works contemplate the role of AI in financial modeling, the management of energy instruments, and the intersections with cryptocurrencies. They examine the dialectic tensions in financial markets, the replacement of legal frameworks with regulatory technology, and the formalization of GDPR provisions. The integration of RegTech into banking's digital transformation is also a recurring theme, alongside the role of FinTech in diminishing poverty and inequality in Latin America and assessing customer readiness for FinTech services in Bangladesh.

Furthermore, these titles explore the financial inclusion next frontiers, banking challenges postcrisis regulation, the emergence of mobile payment systems in China, and the EU's response to the regulatory sandbox phenomenon (Xie & Zhu, 2022). They investigate the efficiency of banks in Tunisia, sentiment analysis in Thai financial news, and the detection of credit card fraud through incremental learning strategies. The social co-governance of intellectual property protection in e-commerce, the evolution of African blockchain ambitions, and the reshaping of corporate responsibility in the banking industry are also scrutinized.

Collectively, these studies underscore the transformative potential and the complex challenges posed by AI and digital technologies in the financial sector, revealing the depth and breadth of academic inquiry into FinTech's rapidly evolving landscape.

7. Conclusion

This study embarked on an explorative journey to dissect the evolving landscape of misconduct within the FinTech sector, scrutinizing the interplay between technological innovation and ethical challenges (Dong & Yu, 2023). Through a comprehensive analysis, our findings reveal a nuanced pattern of misconduct, ranging from data breaches to fraudulent practices, exacerbated by the rapid adoption and integration of cutting-edge technologies. Notably, the study identifies a shift in the nature of financial fraud, driven by the complexity and anonymity afforded by digital platforms.

The complementary methodologies employed in this study are aimed at providing a rigorous and systematic analysis of the academic discourse regarding misconduct in FinTech. We meant to get a thorough knowledge of research trends, prominent authors, and emerging themes by employing a combination of bibliometric analysis, scientometric analysis, and topic modeling.

Several limitations should be considered in the interpretation of the findings. Firstly, the study's scope was limited to articles published in Web of Science Dimension.ai and Scopus databases, potentially excluding relevant literature from other sources. Secondly, the accuracy

of topic modeling depends on the quality of text preprocessing and the number of topics chosen. Finally, citation counts may not always reflect the quality or impact of an article, as some articles may receive more citations due to controversial or disputed findings.

Our results confirm that the existing body of literature pertaining to misconduct within the fast expanding FinTech business highlights a significant and complex problem that needs the collective focus of scholars, policymakers, and industry professionals. The increasing enthusiasm surrounding FinTech has led to notable progress in the realm of digital financial services; yet, it has also shown susceptibilities to possible malfeasance. The expanding amount of scholarly literature emphasizes the necessity of acquiring a comprehensive understanding of the many types of misbehavior, including fraudulent behaviors, data breaches, and misleading commercial practices. These actions can have extensive ramifications for customers, organizations, and the broader financial system. In light of the ongoing evolution of the FinTech ecosystem, it is imperative for academics to keep a diligent stance in spotting emerging trends and hazards. Simultaneously, policymakers must take proactive measures to build comprehensive regulatory frameworks that effectively safeguard consumers and uphold market integrity. It is imperative for industry stakeholders to engage in proactive collaboration in order to cultivate a climate that promotes responsible innovation and ethical behavior. By collaboratively tackling wrongdoing in the field of financial technology, we can provide the foundation for a durable and reliable digital financial ecosystem that fulfills the potential of technological progress while safeguarding the interests and well-being of all parties concerned.

Indeed, numerous benefits have been created by the FinTech industry's fast expansion and innovation, but it has also shown weaknesses that may be exploited by dishonest individuals. The need for improved safeguards to protect customers and uphold market integrity has been underlined by actual incidents of wrongdoing, including fraud, data breaches, and deceptive marketing. Collaboration between regulatory agencies, academic institutions, and industry stakeholders is crucial for promoting the FinTech sector's sustainable growth and public confidence. To ensure the moral behavior and long-term profitability of FinTech, it is imperative to strengthen compliance rules, encourage transparency, and enforce harsh consequences for wrongdoing. An in-depth knowledge of misbehavior in FinTech and the creation of practical mitigation methods will benefit from ongoing study and analysis of new trends and hazards. A promising area of research could be the use of topic modeling to spot early warning signals coming from other sources such as the press or social media.

Scholars have also focused on incorporating emerging technologies such as block-chain, artificial intelligence, and machine learning in combating financial fraud. These technologies can significantly enhance fraud prevention and detection (Mehta et al., 2022). The adoption of such advanced technologies is essential for staying ahead of sophisticated fraudsters. The global use of artificial intelligence has significantly enhanced the ability to deal with financial information manipulation, while data science can help understand the probability of risk associated with various data patterns (Beena et al., 2021). By analyzing vast amounts of financial data, data science can also identify potential anomalies and fraudulent behavior, aiding in the early detection and prevention of financial crimes. Additionally, cognitive computing is fundamental for recognizing fraudulent behavior patterns and analyzing vast data sets (Faccia, 2023). With cognitive computing, financial institutions can enhance their fraud detection capabilities, enabling them to respond more effectively to emerging threats.

These revelations hold profound implications for regulatory frameworks and corporate governance within the FinTech domain. They underscore the urgent need for adaptive, technology-aware regulatory strategies that can keep pace with the sector's rapid evolution. The integration of AI and machine learning in fraud detection, although promising, brings forth new challenges and ethical considerations, particularly regarding data privacy and the potential for algorithmic

bias.

RegTech and SupTech represent the convergence of technology and regulation, transforming the way financial institutions and authorities approach compliance and supervision. By leveraging advanced technologies, RegTech enhances the efficiency of compliance processes, while SupTech empowers competent authorities with data-driven insights for effective supervision. While challenges exist, the continuous development and adoption of RegTech and SupTech hold great promise for the future of the financial industry, promoting transparency, accountability, and consumer protection.

Looking forward, future research should focus on longitudinal studies to understand the longterm effects of regulatory changes in FinTech. Developing predictive models that can preemptively identify potential misconduct and exploring the effectiveness of various regulatory approaches in different cultural and economic contexts will be pivotal. Furthermore, understanding the role of consumer awareness and education in preventing financial fraud can offer valuable insights for developing more robust financial ecosystems.

In conclusion, our study not only sheds light on the darker facets of the burgeoning FinTech industry but also serves as a clarion call for more dynamic, informed, and technology-integrated approaches to curb financial misconduct. As FinTech continues to reshape the financial landscape, understanding and mitigating its associated ethical challenges is not just an academic exercise but a pressing necessity for safeguarding the integrity of financial markets and protecting consumer rights. The balance between technological advancement and ethical financial practices remains delicate and ever-evolving, calling for continuous vigilance and proactive measures from regulators, industry practitioners, and academics alike.

By working together, we can build a FinTech ecosystem that is more secure and resilient, meets societal demands, and upholds the greatest standards of honesty and responsibility.

Data availability

Data will be made available on request.

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