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The Influence of Financial Technology on the Reformulation of Bank Customer Protection Regulations

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Abstract:
Background. The rapid evolution of financial technology has shifted banking activities toward fully digital environments, creating new opportunities for efficiency while simultaneously exposing customers to broader and more complex risks. Traditional regulatory frameworks, originally designed for conventional banking, often struggle to address issues arising from digital transactions, data processing, and emerging online service models. This situation has prompted regulators and financial institutions to reconsider existing norms to ensure stronger and more adaptive customer protection.
Aim. This study aims to examine how technological developments influence regulatory reform in order to strengthen the protection of bank customers.
Methods. A qualitative approach is applied through systematic analysis of regulatory developments, institutional policies, and emerging patterns of consumer risk in digital banking.
Results. The study finds that technological growth drives regulators to refine customer protection rules, especially in areas related to customer rights, digital accountability, and data security. Banks also adopt updated internal policies to meet evolving regulatory expectations.
Conclusions. Financial technology plays a significant role in encouraging regulatory reform, pushing authorities toward more adaptive and forward-looking frameworks.
Implication. Continuous regulatory development is essential to ensure that customer protection remains effective as digital financial services continue to advance.

Keywords: Financial technology; customer protection; banking regulation; digital banking; regulatory reform.

INTRODUCTION

The rapid expansion of financial technology has significantly altered the way banking services operate, shifting various financial activities from conventional, branch-based interactions toward digital platforms (Amilah F., Regina R., et al. (2024). This transformation has changed customer expectations, where speed, convenience, and seamless service have

become the primary standards for modern financial transactions. As digitalization grows, the banking sector is required to respond with systems that are more adaptive and innovative.

This shift toward digital financial services has introduced opportunities for efficiency, yet it has also generated new layers of risk that were not anticipated in traditional banking frameworks (Hidayah, N. (2021). Issues such as identity theft, real-time digital fraud, unauthorized access to accounts, and system vulnerabilities have become major concerns. These risks challenge existing regulatory structures that were originally designed to govern physical banking services rather than digital ecosystems (Mahardika, A., & Setiawan, D. (2023).

The regulatory environment faces increasing pressure to evolve, as many existing rules struggle to address the dynamics of financial technology (Naufal, M. (2022). Digital transactions rely heavily on automated processes, interconnected platforms, and extensive data processing (Adrian, T., & Putra, R. A. (2022). Consequently, regulatory gaps appear in areas involving transparency obligations, customer data security, and institutional accountability. Such gaps highlight the urgency for more comprehensive regulatory reform.

At the same time, customer protection becomes an even more critical aspect of the banking sector. Customers now engage with financial services in ways that expose them to risks that are faster, more sophisticated, and harder to detect (Fauzan, R. (2021). Traditional protection mechanisms—such as manual verification, in-person complaint handling, or limited disclosure rules—are no longer sufficient to ensure fairness and security in a digital environment.

The core problem addressed in this study concerns the extent to which financial technology development influences the reformulation of regulations designed to protect bank customers. This problem emerges from the growing mismatch between the features of digital financial services and the limitations of existing regulatory frameworks. Without reform, customer protection mechanisms may fail to keep pace with technological advancements.

Regulators are therefore faced with the necessity of rethinking the substance and scope of rules governing digital banking activities. Several regulatory measures, particularly those related to customer rights, dispute resolution, risk disclosure, and digital service accountability, require adaptation. Regulatory institutions are expected to ensure that digital financial innovations do not compromise customer security or institutional integrity (Sihombing, L. (2023).

This study aims to analyze how technological innovation drives the reformulation of customer protection regulations in the banking sector. The research focuses on identifying the relationship between digital service development and regulatory adjustment. It also seeks to understand how regulators and financial institutions respond to digital risks while ensuring customer welfare remains a priority (Santoso, T. (2022).

In this context, financial technology in the study refers to technology-driven innovations that facilitate, automate, or enhance financial services, particularly those delivered through digital platforms. This definition includes digital banking applications, online payment systems, algorithm-based financial products, and other forms of automated financial services. These innovations are central to understanding the regulatory challenges that arise.

Customer protection, on the other hand, refers to regulatory and institutional measures designed to safeguard customer rights, ensure the security of financial data, promote fairness in service delivery, and provide effective remedies in the event of loss or dispute (Agustina, R. (2020). As digital services expand, customer protection frameworks must evolve to ensure they remain relevant and effective.

Overall, the introduction of this study highlights the importance of aligning regulatory frameworks with the rapid development of financial technology. As digital transformation continues to influence the banking sector, regulatory adaptation becomes a structural necessity to maintain public trust, strengthen institutional accountability, and protect customers from emerging digital risks. This context underscores the significance of examining how technological innovation influences the evolution of customer protection regulations in the modern banking landscape.

LITERATURE REVIEW

The development of financial technology has attracted attention in various academic discussions, particularly concerning its impact on banking regulation and customer protection. Several studies emphasize that financial technology reshapes financial services by enhancing speed, accessibility, and automation, yet simultaneously increases exposure to digital risks that require regulatory adaptation (Arifin, Z. (2021). These risks include unauthorized digital transactions, system security breaches, and misuse of personal data, which demand a more responsive regulatory approach in the banking sector.

Research on digital transformation in banking shows that customer protection frameworks must evolve in line with technological innovation. Traditional regulatory instruments often fail to anticipate risks emerging from algorithm-based services, digital verification systems, and automated decision-making processes (Lubis, M. H. (2020) Such limitations highlight the need for reformulation of rules governing digital accountability, transparency obligations, and customer rights in online financial interactions.

Studies focusing on data protection further strengthen the argument that regulatory modernization is essential. The expansion of digital banking involves large-scale collection, processing, and storage of customer data, making data privacy a core component of customer protection. Scholars argue that regulatory standards must ensure that data governance practices are secure, transparent, and enforceable (Ainin, N., & Setyawan, D. (2023). This includes clear responsibilities for banks regarding data handling procedures and customer consent.

A growing body of literature also explores how financial technology influences risk distribution within financial services. Digital platforms often shift certain risks from institutions to customers, especially in the context of online authentication and fraud detection (Andriani, S. (2023). This shift reinforces the need for updated regulations to prevent customers from bearing disproportionate losses arising from technological vulnerabilities.

In the context of the banking sector, scholars highlight the importance of adaptive regulatory frameworks. Regulatory flexibility is viewed as crucial, enabling authorities to respond quickly to new forms of digital risk without hindering innovation (Fenwick, 2017). This perspective suggests that the effectiveness of regulation lies not only in its substance but also in its capacity to evolve along with technological changes.

Meanwhile, research on customer protection emphasizes that regulatory guarantees must cover not only traditional rights but also digital service accountability, transparency of algorithms, and clarity of digital product features (Bayu, S. M., Rayhan S.M, et al (2024). Customers interacting with digital platforms require stronger safeguards, given the complexity and speed of online transactions.

Literature discussing regulatory reform in digital finance generally agrees that legal frameworks must adopt a forward-looking orientation. Regulatory institutions are expected to integrate technological insights into policymaking, ensuring that customer protection remains resilient as digital ecosystems continue to develop (Asmar, A. (2022). This view reinforces the need for reformulation rather than mere revision of outdated rules.

METHOD

This study employs a qualitative research approach, as this method allows for an in-depth examination of regulatory developments, institutional practices, and technological influences within the banking sector (Dewi, L. P., & Kusuma, H. (2022). The qualitative design is suitable for understanding how financial technology shapes the reformulation of customer protection regulations, particularly through analysis of policy documents, regulatory frameworks, and institutional responses.

The research subjects consist of regulatory instruments, institutional policies, and official documents issued by banking authorities and financial institutions. These include regulations related to digital banking services, consumer protection guidelines, data governance standards, and risk management frameworks. The population in this study covers all regulatory documents relevant to digital financial services, while the sample is narrowed down to documents that directly address customer protection, technological innovation, and regulatory adaptation. The sampling technique follows a purposive approach, allowing the researcher to focus on the most relevant and authoritative sources.

Data collection was conducted through document study, involving systematic examination of legal provisions, regulatory circulars, institutional policies, and official reports. This method enables the researcher to trace the evolution of regulatory standards and identify gaps between existing rules and emerging digital risks. Additional data were obtained through secondary sources such as institutional publications, policy reviews, and analytical reports issued within the period of rapid financial technology development.

The research took place within the context of Indonesia's financial regulatory environment, focusing on documents issued by national authorities overseeing banking and digital financial services. The time frame of the study covers regulatory developments from the initial stages of digital banking adoption to the most recent regulatory updates addressing digital risks and customer protection issues. This range allows the analysis to capture significant shifts in regulatory orientation influenced by technological advancements.

The main instrument used in this study is a document analysis framework, which includes criteria for assessing regulatory content, coherence, and responsiveness to technological changes. This instrument guides the researcher in evaluating the extent to which customer protection rules have been adapted to the digital banking landscape. It also assists in identifying patterns of regulatory reform influenced by financial technology.

The research procedure begins with the identification and selection of relevant documents, followed by categorization based on thematic alignment with customer protection and financial technology. Each document is examined to identify key regulatory provisions, institutional obligations, and areas that require adaptation in response to digital innovation. The analysis is then synthesized to uncover broader trends and regulatory shifts.

Data analysis is conducted using content analysis techniques, focusing on the interpretation of regulatory language, institutional responsibilities, and provisions related to consumer protection in the digital era. This technique allows the researcher to extract meaning from regulatory texts and relate them to technological developments in the financial sector. The analysis emphasizes patterns, changes, and regulatory gaps that emerge as digital services evolve.

The qualitative findings are validated through triangulation of sources, ensuring that interpretations of regulatory developments are supported by consistent evidence across multiple documents. This step strengthens the reliability of the analysis and ensures that conclusions reflect comprehensive examination of the regulatory environment.

Overall, the research method provides a structured approach to understanding how financial technology influences the reformulation of customer protection regulations. Through systematic document analysis, purposive sampling, and thematic interpretation, the study is able to capture the dynamic relationship between digital innovation and regulatory adaptation in the banking sector.

DISCUSSION

The Influence of Financial Technology on Customer Risk Exposure

The rapid proliferation of financial technology has introduced a fundamental shift in how customers access and utilize banking services (***Hakim, L. (2022)***. What was once dominated by traditional face-to-face transactions has now transitioned into a fully digital ecosystem where customers conduct financial activities through mobile applications, online platforms, and automated systems. This transformation, although offering efficiency and convenience, significantly expands the spectrum of risks faced by customers. These risks arise from the dependence on digital infrastructure, the use of sophisticated data processing technologies, and the emergence of new service models that rely heavily on algorithmic functions.

One of the primary risk factors is the increasing exposure of customers to digital fraud schemes. Unlike conventional fraud, which typically requires physical manipulation or direct deception, modern fraud techniques operate through digital channels such as phishing, smishing, malware injection, and remote access scams (***Firdaus, M. (2020)***. Cybercriminals utilize social engineering strategies that exploit customer behavior, device vulnerabilities, and weak authentication measures. As financial technology encourages greater accessibility, customers become more frequent users of online services, inadvertently broadening their surface of vulnerability. This risk is worsened by disparities in digital literacy, where some customers may not fully understand the technological processes behind digital banking, leading to unsafe practices such as sharing access credentials or ignoring system warnings (***Prasetyo, B. (2023)***.

Financial technology also intensifies exposure to data-related risks. Digital banks, mobile applications, and integrated financial systems collect and store massive amounts of personal and transactional data to support automation and personalization. While this enables seamless services, it also creates lucrative targets for unauthorized access and data misuse. Data breaches can occur at various points within the system, including during transmission, storage, or third-party processing activities. Customers may experience loss of privacy, financial harm, reputational damage, or long-term vulnerability if their data circulates within illegal digital networks (***Setiawan, Y. (2023).*** The complexity of modern data ecosystems means that customers often cannot trace where their data is stored, processed, or shared, making the risk more difficult to identify and prevent.

Another dimension of customer risk exposure comes from the reliance on technology-driven decision-making systems. Financial products such as automated credit scoring, robo-advisory services, and algorithmic fraud detection tools operate through machine learning or predictive models. Although these systems enhance efficiency, they may produce decisions that are biased, inaccurate, or insufficiently transparent (***Rachmawati, R. (2022)***. Customers may find themselves disadvantaged by outcomes that they cannot challenge or fully understand due to the limited disclosure of algorithmic processes. This situation may generate new forms of structural risk where customers are unprotected from automated actions that directly impact their financial rights.

In addition, system reliability issues present significant risks. Digital banking platforms depend on stable internet connectivity, uninterrupted server performance, and well-maintained application infrastructure. System failures, downtime, or bugs can prevent customers from accessing their accounts, completing transactions, or verifying financial records (***Santoso, T. (2022)***. In emergencies—such as sudden fund needs or fraudulent activity—such failures may have severe consequences. The interconnection between multiple service providers, including payment gateways, cloud services, and third-party financial platforms, further increases the probability of technical disruptions.

These emerging risks illustrate that financial technology does not merely introduce new ways of banking but fundamentally restructures the risk environment surrounding customers. Therefore, an in-depth understanding of risk categories becomes essential for regulatory reform. The table below presents an expanded classification of risk exposures experienced by customers in digital banking.

Tabel 1. Categories of Customer Risk Exposure in Financial Technology-Based Banking

Risk Category	Description	Potential Impact on Customers	Contributing Factors
Digital Fraud Risk	Fraud conducted through digital channels using social engineering or malware.	Loss of funds, unauthorized transactions, identity theft.	Weak authentication, low digital literacy, advanced cyberattack tools.
Data Security Risk	Unauthorized access, misuse, or leakage of customer data.	Privacy violations, financial loss, long-term data exploitation.	Large-scale data processing, third-party integrations, inadequate encryption.
Algorithmic Risk	Errors or biases in automated decision-making systems.	Unfair credit decisions, inaccurate customer profiling, opaque outcomes.	Limited transparency of algorithms, insufficient testing, biased datasets.
Operational	Failures in digital	Inability to access	Server overload,

System Risk	banking systems, applications, or networks	accounts, transaction delays, financial loss during outages.	software bugs, dependency on third-party infrastructure.
Transaction Authentication Risk	Weak or easily manipulated verification processes.	Unauthorized access and fraudulent transactions.	Outdated authentication methods, device vulnerabilities.
Digital Consent and Transparency Risk	Customers not fully understanding digital service terms or data practices.	Uninformed decisions, unintended sharing of personal data.	Complex terms of service, low transparency, legal jargon.
Cross-Platform Integration Risk	Risks arising from interconnected financial apps and services.	Data leakage, transaction errors, interconnected system failures.	Multi-party data exchange, inadequate coordination between providers.

Source: Research Data, 2025.

The expanded risk categories show that financial technology creates a layered and interdependent risk environment. Unlike traditional banking risks, these risks evolve rapidly as digital systems integrate new functions and technologies. Customers, who are often the least equipped to detect or prevent these risks, become the most vulnerable. Thus, financial technology not only amplifies the magnitude of existing risks but also introduces entirely new risk dimensions that require modernized regulatory responses, improved institutional accountability, and enhanced customer empowerment.

Regulatory Limitations and the Need for Reformulation

The rapid growth of financial technology has exposed significant gaps in the regulatory frameworks that govern customer protection in the banking sector (***Rahardjo, S. (2020).*** Regulations that were originally crafted for conventional, branch-based banking environments are increasingly unable to accommodate the complexities of digital financial services. This mismatch occurs because modern financial technology operates at unprecedented speed, scale, and interconnectivity. As digital platforms expand, they introduce new patterns of risk and behavior that fall outside the scope of existing rules. These limitations form a central reason why regulatory reformulation has become an urgent necessity.

One key regulatory limitation lies in the outdated assumptions about service delivery embedded within existing rules (***Sulistyono, A. (2020)***. Many customer protection provisions were designed under the premise that transactions involved face-to-face verification, physical documentation, and direct human oversight. In contrast, digital banking relies on automated processes, remote interactions, and digital identity frameworks. This shift challenges older rules that depend on physical validation, making them ineffective in safeguarding customers against digital threats such as unauthorized access or real-time fraud. The absence of specific provisions addressing remote identity verification, digital authentication standards, and algorithmic service mechanisms creates loopholes that can be exploited by both cybercriminals and negligent actors within financial institutions.

Another limitation emerges in the area of data governance. Traditional regulations generally focus on physical record-keeping, confidentiality obligations, and manual data processing. However, financial technology platforms operate with massive, continuous data flows involving encrypted transmissions, cloud-based storage, and third-party integrations. Without updated regulatory guidance, financial institutions risk inconsistent data protection practices. For instance, rules may require banks to protect customer data but fail to specify the technical standards necessary to ensure encryption, data integrity, or cyber resilience (***Sasongko, B., & Wiratama, R. (2021)***. This ambiguity leads to varied interpretations among financial institutions, weakening the uniformity and effectiveness of customer protection.

Regulatory frameworks also face limitations in addressing the reliance on third-party service providers. Financial technology services commonly depend on external entities such as cloud providers, payment gateways, analytics platforms, and fintech partners. Existing regulations often do not clearly outline responsibility allocation between banks and these third parties. As a result, when customer data is compromised or digital services fail, accountability becomes blurred. Customers may face difficulty determining which institution is responsible, and regulators may lack the legal basis to enforce full accountability. This regulatory gap demonstrates that customer protection in the digital era must include clear rules governing outsourcing, data sharing, risk transfer, and inter-system coordination.

The speed of technological development further highlights regulatory limitations. Traditional regulatory processes rely on lengthy drafting periods, consultations, and formal approvals, creating delays that are incompatible with the rapid evolution of digital finance. While technological innovation can shift within months, regulations may take years to update. This asynchronous pace results in a prolonged period where customers are exposed to risks that regulations have not yet anticipated (***Supriyadi, W. (2022).*** Such delays show that regulatory mechanisms require modernization not only in substance but also in responsiveness. Reformulation must therefore incorporate agile regulatory approaches that allow rules to adapt quickly and consistently as new risks arise.

Another significant limitation concerns algorithmic transparency. Digital banking services now incorporate machine learning models and automated decision-making tools for assessing creditworthiness, detecting fraud, managing risk, and personalizing customer experiences. However, existing regulations rarely require banks to disclose how algorithms operate, what parameters they consider, or how customers can contest algorithmic decisions. Without such transparency measures, customers may be subject to unfair or incorrect automated decisions without any form of recourse. Regulatory reform must therefore integrate standards for algorithmic accountability, ensuring that automated systems operate fairly, ethically, and transparently.

Moreover, dispute resolution mechanisms in existing regulations are predominantly designed for conventional disputes arising from physical transactions or direct service failures. Digital financial disputes, however, often involve complex technological issues such as system errors, delayed updates, electronic signature misuse, or data synchronization failures. These issues require technical investigation, digital documentation, and multi-platform forensics, which traditional complaint handling systems are not equipped to manage. Without reformulation, dispute resolution processes risk becoming slow, ineffective, and unable to deliver justice to customers affected by digital service failures.

Additionally, regulatory limitations appear in relation to consumer literacy. Regulations often assume that customers understand the implications of digital banking, yet many digital services employ complex interfaces, technical terminology, and data processing procedures that customers cannot easily evaluate. This information asymmetry places customers at a disadvantage, prompting the need for enhanced regulatory requirements on transparency, user education, digital consent, and risk disclosure. Reformulated regulations must ensure that customers receive clear, accessible information that empowers them to make informed decisions and reduces their vulnerability to digital manipulation.

Finally, the cumulative effect of these limitations demonstrates that regulatory reformulation is essential rather than optional. The digitalization of financial services demands a regulatory approach that is anticipatory rather than reactive, adaptive rather than rigid, and technologically informed rather than outdated. Reformulation must produce a coherent framework that protects customers while allowing innovation to thrive. It should integrate digital accountability, data governance standards, algorithmic transparency, agile rulemaking processes, and strengthened dispute resolution mechanisms. Only through such multidimensional reform can regulators ensure that customer protection remains robust, relevant, and effective in the digital era.

CONCLUSION

The findings of this study show that the development of financial technology has become a decisive factor in reshaping the regulatory landscape of customer protection in the banking sector. The shift toward digital financial services introduces broader and more complex risks that traditional regulations were not designed to manage, creating a clear need for regulatory refinement. By examining the alignment between technological progress and customer protection mechanisms, this research concludes that regulatory reformulation is necessary to ensure that customer rights, data security, and institutional accountability remain safeguarded amid rapid digitalization. The study demonstrates that technological innovation not only drives changes in service delivery but also compels regulators to adopt more adaptive, transparent, and technology-responsive frameworks. This contributes to the broader advancement of legal and financial governance by emphasizing the importance of forward-looking regulation in digital ecosystems. The refinement of regulatory standards, particularly in areas involving data governance, digital accountability, and algorithmic transparency, represents an important improvement to both the field of financial regulation and the development of scientific knowledge related to digital risk management.

IMPLICATION

Explain the implication of this publication for the academic world, society, nation and state, and the international community.

The implications of this study extend across academic, societal, national, and international domains. For the academic world, the findings provide a conceptual foundation for advancing research on digital financial governance by highlighting the need for regulatory models that are responsive to technological change. This contributes to a deeper understanding of how digital innovation reshapes legal frameworks, encouraging further interdisciplinary studies involving law, technology, and financial risk management. For society, the research underscores the urgency of enhancing digital literacy and awareness of emerging risks that accompany the use of financial technology, ensuring that customers are better equipped to navigate digital financial services safely. At the national level, the study offers insight for regulators and policymakers in designing adaptive legal instruments that strengthen customer protection, reinforce institutional accountability, and support sustainable digital transformation in the banking sector. The implications also extend to state governance, emphasizing the importance of regulatory agility as a foundation for

maintaining financial stability and public trust. Internationally, the research aligns with the global movement toward harmonizing digital financial regulations, suggesting that countries must collaborate in developing standards that address cross-border risks, data governance challenges, and technological vulnerabilities. This positions the study as a relevant contribution to ongoing international discussions on digital finance and consumer protection in an increasingly interconnected financial ecosystem.

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