

# Legal Protection for Customers in Artificial Intelligence-Based Digital Financing through the Strengthening of Banking Prudential Principles in Indonesia

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**Abstract:** This study analyzes customer protection in artificial intelligence based digital financing in Indonesia through the strengthening of banking prudential principles. Using normative legal research with doctrinal and conceptual approaches, this study examines banking, consumer protection, data protection, digital finance, and alternative credit scoring regulations. The findings show that customer protection has been recognized, but remains fragmented across several legal regimes. This condition weakens preventive protection against opaque scoring, inaccurate profiling, excessive data use, and limited remedies for automated decisions. The study proposes algorithmic prudence as a framework that integrates data governance, model validation, explainability, human oversight, and third party accountability into prudential banking obligations.

**Keywords:** Artificial Intelligence; Banking Prudence; Customer Protection; Digital Financing

**Abstrak :** Penelitian ini menganalisis perlindungan nasabah dalam pembiayaan digital berbasis kecerdasan buatan di Indonesia melalui penguatan prinsip kehati hatian perbankan. Dengan menggunakan penelitian hukum normatif melalui pendekatan doktrinal dan konseptual, penelitian ini menelaah regulasi perbankan, perlindungan konsumen, perlindungan data, keuangan digital, dan pemeringkatan kredit alternatif. Temuan menunjukkan bahwa perlindungan nasabah telah diakui, tetapi masih tersebar dalam beberapa rezim hukum. Kondisi ini melemahkan perlindungan preventif terhadap pemeringkatan yang tidak transparan, profil yang tidak akurat, penggunaan data berlebihan, dan terbatasnya upaya keberatan atas keputusan otomatis. Penelitian ini menawarkan konsep kehati hatian algoritmik sebagai kerangka yang mengintegrasikan tata kelola data, validasi model, keterjelasan, pengawasan manusia, dan akuntabilitas pihak ketiga ke dalam kewajiban prudensial perbankan.

**Kata kunci:** Kecerdasan Buatan; Kehati-hatian Perbankan; Perlindungan Nasabah; Pembiayaan Digital.

## INTRODUCTION

The acceleration of digital transformation in Indonesia's financial services sector has changed the manner in which customers access credit, financing, and banking products. Artificial intelligence is increasingly used to process customer data, assess creditworthiness, automate risk classification, personalize offers, and support financing decisions that previously depended on human judgment. These developments create efficiency and widen access to finance, but they also

produce new legal risks when customers are assessed through opaque models, alternative data, and automated profiling,(Xu et al. 2024). The central problem is that legal protection for customers may become ineffective if the law remains focused only on conventional disclosure, complaint handling, and contractual consent.

In banking law, the prudential principle has traditionally functioned as a legal foundation for maintaining bank soundness, risk control, and public trust,(Kusumastuti 2022). In the context of artificial intelligence-based digital financing, however, prudence can no longer be understood merely as capital adequacy, liquidity, asset quality, or administrative compliance. It must also cover data governance, algorithmic accountability, cyber resilience, model validation, explainability, and the prevention of discriminatory or irresponsible financing decisions. This study is therefore grounded in the practical and theoretical urgency of redefining customer protection through a more adaptive interpretation of banking prudential principles.

Recent legal scholarship on digital finance in Indonesia generally emphasizes financial inclusion, regulatory modernization, and the role of fintech platforms in expanding credit access for underserved communities,(Setiawan et al. 2024). Studies on peer-to-peer lending and digital banking tend to highlight consumer vulnerability in online contracts, personal data misuse, aggressive collection practices, and weak literacy in financial services,(Ariawan, Gulyamov Said Saidaxrarovich, and Naeem Allahrakha 2025). This line of research is important because it shows that digital financing is not only an economic innovation but also a legal relationship marked by information asymmetry. Nevertheless, most of these studies still examine consumer protection as a market conduct issue rather than as a prudential banking issue.

Another strand of literature discusses the transformation of banking regulation after the strengthening of Indonesia's financial sector legal framework. These studies usually focus on institutional supervision, financial stability, digital service licensing, and the authority of regulators in responding to technological innovation. They show that Indonesian financial law is moving toward a more integrated model of supervision over banks, fintech actors, digital financial innovation, and consumer protection,(Tritto, He, and Junaedi 2020). However, the discussion often remains regulatory-descriptive and has not sufficiently explained how artificial intelligence changes the normative content of prudential obligations in customer-facing financing services.

Comparative and international studies on AI-based credit assessment have increasingly examined algorithmic bias, automated decision-making, explainability, data protection, and the right of individuals to challenge adverse financial decisions,(Bahlool, Hewahi, and Elmedany 2026). These studies reveal that artificial intelligence may reproduce social bias through proxy variables, incomplete datasets, or risk models that are technically accurate but legally unfair. They also underline the need for governance mechanisms that make AI systems auditable, contestable, and accountable to regulators and affected customers. Yet such comparative discussions cannot be transplanted directly into Indonesia without considering the specific structure of Indonesian banking law, OJK supervision, digital financial innovation, and the social function of access to finance.

Studies on prudential banking regulation have long treated prudence as an institutional obligation imposed on banks to avoid excessive risk-taking and protect the stability of the financial system. This approach remains relevant, but it is incomplete when financing decisions are increasingly mediated by algorithms, third-party technology providers, alternative credit scoring institutions, and digital ecosystems. In such a setting, customer harm may arise not only from bank insolvency or contractual abuse, but also from inaccurate scoring, hidden data processing, automated exclusion, and weak control over outsourced AI systems. Therefore, the literature needs to move from a conventional prudential paradigm toward an algorithmic prudential paradigm that connects bank soundness with customer rights.

The gap between prior studies and current realities is visible in the way AI-based digital financing operates in practice. Customers may submit applications through mobile applications, while their eligibility is assessed using transactional histories, device information, e-commerce patterns, payment behavior, and other alternative data. The customer often does not know which data are used, how the score is produced, why a financing application is rejected, or how an

inaccurate profile can be corrected. This situation shows a normative imbalance between technological capability and legal accountability.

Indonesian law already provides several important foundations for addressing this problem, including banking regulation, consumer protection in the financial services sector, personal data protection, information technology governance, and digital financial innovation supervision. However, these norms are dispersed across different regulatory instruments and are not always conceptually integrated into a single framework of AI-based customer protection, (Sukawati and Amad Sudiro 2025). As a result, the legal standard for responsible AI use in digital financing may remain fragmented between market conduct, data protection, operational risk, and prudential supervision. This fragmentation creates uncertainty for customers, banks, fintech partners, and regulators.

This research challenges the assumption that customer protection in digital financing can be adequately secured through ex post remedies such as complaint mechanisms, dispute settlement, or administrative sanctions after harm occurs. In AI-based financing, harm may arise before the customer fully understands the legal relationship, especially when automated scoring affects access, pricing, loan limits, or risk categorization, (Lee 2020). Protection must therefore be designed ex ante through prudential duties that require banks to ensure fairness, accuracy, transparency, security, and human oversight before AI systems are used in financing decisions. The prudential principle should operate not only as a shield for institutional stability but also as a normative instrument for preventing algorithmic harm to customers.

Based on that gap, the main research problem of this article concerns how legal protection for customers in artificial intelligence-based digital financing should be constructed through the strengthening of banking prudential principles in Indonesia. This problem can be elaborated into three questions: how does the existing Indonesian legal framework protect customers in AI-based digital financing; what weaknesses arise from the current separation between consumer protection, data protection, and prudential banking norms; and how should prudential principles be reformulated to respond to algorithmic risks. These questions are important because digital financing increasingly depends on systems that are technically complex but legally consequential for individual customers. The study seeks to answer these questions by linking doctrinal legal analysis with a critical reading of technological risk in banking services.

The objective of this study is to analyze the adequacy of Indonesian legal protection for customers in AI-based digital financing and to formulate a strengthened prudential model for banks and related financial service actors. The study adopts a normative juridical approach by examining statutory provisions, regulatory policies, supervisory principles, and legal doctrines relevant to banking prudence, consumer protection, personal data protection, and digital finance. The analysis also uses a conceptual approach to interpret prudence as a dynamic legal principle that must evolve with technological risk. Through this approach, the study positions prudential banking law as an entry point for reconciling innovation, customer rights, and financial system stability.

The originality of this article lies in its effort to reconstruct the prudential principle as a legal basis for algorithmic customer protection in Indonesia's digital financing ecosystem. Unlike previous studies that separately discuss fintech consumer protection, banking risk management, or data privacy, this study integrates those dimensions into the concept of algorithmic prudence. This concept requires banks and financial service actors to treat AI governance, explainability, data accuracy, human oversight, and non-discrimination as part of prudential compliance. Accordingly, the article contributes to Indonesian banking law by offering a normative framework that shifts customer protection from reactive dispute resolution toward preventive, risk-based, and accountable governance of AI-based financing.

## **METHODS**

This study employs a normative legal research design with doctrinal and conceptual approaches to examine the legal protection of customers in artificial intelligence-based digital financing through the strengthening of banking prudential principles in Indonesia. The doctrinal approach is used to analyze the structure, hierarchy, and normative coherence of legal rules governing banking prudence, financial consumer protection, personal data protection, digital

financial innovation, and artificial intelligence governance in financial services. The conceptual approach is applied to reinterpret prudential principles beyond traditional banking stability, so that they also include algorithmic accountability, data accuracy, explainability, fairness, cybersecurity, and human oversight in digital financing decisions. This design is considered appropriate because the research problem concerns the adequacy, consistency, and reformulation of legal norms rather than the measurement of empirical behavior.

The object of this research consists of primary and secondary legal materials relevant to AI-based digital financing and customer protection in Indonesia. Primary legal materials include statutes and regulations concerning banking, financial sector development, consumer protection in financial services, personal data protection, electronic information and transactions, digital financial innovation, and supervisory policies issued by the Financial Services Authority. Secondary legal materials consist of legal doctrines, journal articles, regulatory reports, international policy documents, and scholarly literature on prudential banking regulation, algorithmic governance, digital credit scoring, fintech supervision, and financial consumer protection. The selection of legal materials is based on three criteria, namely direct relevance to digital financing and banking prudence, normative authority within the Indonesian legal system, and analytical contribution to the construction of customer protection in AI-mediated financial services.

Data are collected through document study by identifying, classifying, and reviewing legal instruments, regulatory documents, academic literature, and policy materials related to the research questions. The collection procedure begins with mapping the legal framework on banking prudence and customer protection, followed by tracing provisions on data governance, risk management, digital financing, and the use of technology in financial services. The collected materials are then categorized into four analytical themes, namely customer rights, prudential obligations, algorithmic risk, and regulatory accountability. The data are analyzed qualitatively through legal interpretation, systematic analysis, and normative evaluation to determine whether the existing legal framework is sufficient, where the normative gaps are located, and how prudential principles should be strengthened to provide preventive and accountable protection for customers in AI-based digital financing.

## RESULTS AND DISCUSSION

### Normative Fragmentation of Customer Protection in AI Based Digital Financing in Indonesia

The normative analysis shows that customer protection in AI based digital financing in Indonesia is already supported by several legal instruments, but the protection remains dispersed across different regulatory regimes. Banking law emphasizes institutional soundness and prudential conduct, while financial consumer protection regulation focuses on transparency, fairness, complaint handling, and market conduct,(Adhan S, Yuniati, and Nurfani 2025). Personal data protection law strengthens the position of customers as data subjects, particularly in relation to consent, lawful processing, accuracy, confidentiality, and accountability,(Saputra 2024). However, these frameworks have not yet formed a single integrated doctrine that directly regulates algorithmic decision making in digital financing.

The processed findings indicate that the most serious legal issue is not the absence of regulation, but the lack of normative integration among existing rules. AI based financing involves banking prudence, data processing, digital service governance, customer consent, technology risk, and credit assessment at the same time. Each regulatory domain addresses only part of the risk, while customer harm often emerges from the combination of those domains,(Stanley Chidozie Umeorah et al. 2024).

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**Table 1.** Normative Mapping of Customer Protection in AI Based Digital Financing in Indonesia

Normative Dimension	Existing Legal Orientation	Main Finding	Legal Implication for Customers
Banking prudence	Bank soundness, risk management, and institutional stability.	Prudence remains more institution centered than customer centered.	Customers may not receive sufficient protection from algorithmic credit risk.
Financial consumer protection	Transparency, fairness, education, complaint handling, and dispute settlement.	Protection is stronger after harm occurs than before harm occurs.	Remedies may be reactive and less effective for automated decisions.
Personal data protection	Lawful processing, consent, data accuracy, confidentiality, and accountability.	Data rights are recognized but not fully connected to credit scoring governance.	Customers may not understand how data affects financing eligibility.
Digital banking and IT governance	Technology reliability, security, operational resilience, and service continuity.	Technology risk is regulated, but AI model risk requires more specific control.	Customers remain exposed to opaque, inaccurate, or biased automated decisions.
Alternative credit scoring	Inclusion, alternative data use, and support for limited credit history customers.	Alternative data can expand access but also increase profiling risk.	Vulnerable customers may face digital exclusion or unfair risk classification.

**Source:** Processed by the author from secondary data in the form of primary legal materials.

The table shows that Indonesia has developed a relatively broad legal architecture for digital finance, but the architecture is still segmented by regulatory object. Customer protection is treated as a matter of conduct, data privacy, technology operation, or complaint resolution, depending on which regulation is applied. AI based financing requires these legal categories to be read together because the customer's legal position is shaped by data, algorithmic scoring, contractual terms, and banking risk appetite simultaneously. This finding confirms that legal protection in digital financing cannot rely only on sectoral compliance.

From a prudential perspective, the use of AI in digital financing changes the meaning of risk in banking law. Risk is no longer limited to credit default, liquidity pressure, market exposure, or operational failure. It also includes model opacity, biased datasets, unlawful data processing, inaccurate profiling, and overreliance on automated recommendations, (Seun Solomon Bakare et al. 2024). These risks can weaken customer protection even when the bank appears formally compliant with conventional prudential requirements.

The fragmentation becomes more visible when customer consent is treated as the main legal basis for data processing. In digital financing, consent is often obtained through standard electronic forms that customers accept without full comprehension of the data flow, scoring method, or consequences of automated assessment, (Ferrari 2020). This raises a doctrinal problem because

consent may be formally valid but substantively weak. The law must therefore evaluate whether consent in AI based financing is meaningful, informed, specific, and capable of protecting customers from hidden algorithmic consequences.

The same issue arises in relation to transparency. Financial consumer protection norms generally require clear information about products, benefits, costs, risks, rights, and obligations. However, AI based credit assessment introduces a deeper form of opacity because the decisive factor may not be the written product information, but the internal logic of the scoring model. Transparency must therefore evolve from product disclosure toward decision transparency, including the customer's ability to understand why a financing decision is accepted, rejected, limited, or priced differently.

Another finding concerns the role of alternative credit scoring in expanding access to finance. The use of alternative data can support customers who lack formal credit history, especially micro, small, and medium enterprises or individuals outside conventional banking records. This innovation is legally valuable because it advances financial inclusion and supports broader access to financing. Yet it also creates the risk of digital exclusion when customers are assessed through indirect indicators that may not accurately represent repayment capacity or legal reliability.

The doctrinal implication is that AI based digital financing must be understood as a triangular legal relationship among the customer, the financial institution, and the technology governance system. The customer does not merely enter into a financing contract with a bank or financial service provider. The customer is also subject to data extraction, automated classification, and algorithmic evaluation that may influence legal and economic access, (Mazzini and Bagni 2023). Therefore, customer protection must cover both contractual fairness and algorithmic fairness.

This finding challenges the traditional view that prudential banking law primarily protects the banking institution and the financial system. In digital financing, institutional prudence and customer protection are not separate objectives. A bank that uses inaccurate, biased, insecure, or unexplainable AI systems creates legal risk, reputational risk, operational risk, and credit risk at the same time. Accordingly, protecting customers from algorithmic harm is also part of maintaining banking soundness and public trust.

### **Strengthening Banking Prudential Principles as a Framework for Algorithmic Customer Protection**

The discussion indicates that prudential principles must be strengthened to function as a preventive legal framework for AI based digital financing. Conventional prudence requires banks to act carefully in collecting funds, distributing credit, managing risk, and maintaining public confidence. In AI based financing, this obligation must be expanded to include careful design, testing, deployment, monitoring, and correction of algorithmic systems. Prudence must therefore become a governance principle that controls both financial risk and technological risk.

The first element of strengthened prudence is data prudence. Banks and digital financing providers must ensure that customer data used in AI-based assessments are collected and processed lawfully, and that they are relevant, accurate, limited to what is necessary, secure, and proportionate to the financing purpose. Excessive, outdated, unverified, or irrelevant data may lead to inaccurate risk assessments, unfair lending decisions, and unjustified exclusion of customers from access to financing, (Adedoyin Tolulope Oyewole et al. 2024). Data prudence is essential because algorithmic fairness begins with the quality and appropriateness of the data on which AI systems rely, (Purwanti, Barthos, and Saputra 2025). Ensuring responsible data practices helps reduce bias, improve decision accuracy, and promote fair treatment throughout the financing process.

The second element is model prudence. AI systems used in digital financing must be validated, tested, documented, and monitored to ensure that they operate consistently with legal standards and customer protection principles, (Purwanti et al. 2025). A model may be technically efficient but legally problematic if it produces discriminatory patterns, rejects applications without reasonable basis, or cannot be audited by responsible officers. Model prudence therefore requires banks to treat AI not merely as a business tool, but as a regulated decision support mechanism.

The third element is explainability prudence. Customers affected by AI based financing decisions should receive information that is understandable, relevant, and sufficient to identify the main reasons behind the decision. This does not mean that banks must disclose all technical codes

or confidential trade secrets,(Felzmann et al. 2020). It means that legal accountability requires a reasonable explanation of the factors that materially influence financing eligibility, limits, pricing, or rejection.

The fourth element is human oversight. AI should support banking decisions, but it should not eliminate human responsibility for decisions that affect customer rights and access to finance. Human oversight is needed to review exceptional cases, correct inaccurate data, assess customer objections, and prevent rigid dependence on automated classifications,(Kowsar, Mohiuddin, and Mohna 2023). This is essential because prudence in banking law is ultimately a duty of accountable institutions, not a function delegated entirely to machines.

The fifth element is accountability in cooperation with third party technology providers. Digital financing often involves vendors, credit scoring providers, cloud service providers, data processors, and platform partners. Banks may outsource certain technological functions, but they cannot outsource legal responsibility for prudential compliance and customer protection,(Eichengreen 2021). Therefore, contracts with technology partners must contain clear obligations on data protection, audit access, risk reporting, incident response, model governance, and regulatory cooperation.

The strengthening of prudential principles also requires a shift from reactive protection to preventive protection. Complaint mechanisms and dispute resolution remain necessary, but they are insufficient when customers do not know that harm has occurred or cannot identify the source of an automated decision. Preventive protection requires risk assessment before AI systems are deployed and continuous monitoring after deployment,(Purwanti et al. 2025). This model is more consistent with the preventive character of prudential regulation.

This interpretation supports the concept of algorithmic prudence as the original contribution of this study. Algorithmic prudence means that the duty of care in banking must include the duty to govern data, models, automated decisions, human oversight, and technological accountability. It connects the stability oriented function of prudential regulation with the rights oriented function of customer protection. Through this concept, the law can avoid treating AI risk as merely technical and instead recognize it as a legal risk embedded in financial decision making.

Algorithmic prudence also provides a bridge between financial inclusion and legal protection. AI based financing can widen access to credit, but access without fairness may create a new form of vulnerability. Customers who are accepted through opaque scoring may receive unsuitable financing, while customers who are rejected may never know whether the decision was accurate, lawful, or biased,(Bednarz and Przhedetsky 2023). Prudential law must therefore ensure that inclusion does not become a justification for weak governance.

The proposed framework does not reject technological innovation in banking. Instead, it requires innovation to operate within a legal structure that preserves trust, fairness, accountability, and institutional responsibility. AI can strengthen credit assessment when it is governed properly, but it can also undermine justice when efficiency is prioritized over legal safeguards. The proper legal response is not prohibition, but the integration of AI governance into prudential obligations,(García-Llorente and Olmeda 2026).

Based on the findings, customer protection in AI based digital financing should be reconstructed through four normative directions. First, prudential regulation should explicitly recognize algorithmic risk as part of banking risk management. Second, consumer protection rules should require decision transparency and accessible objection mechanisms for automated financing outcomes. Third, data protection obligations should be integrated with credit assessment governance to ensure lawful, accurate, and proportionate data use.

Fourth, supervisory policy should require banks and related financial service actors to maintain documentation, audit trails, impact assessments, and human accountability for AI systems used in financing. These measures would make customer protection measurable and enforceable within the supervisory process. They would also help regulators assess whether AI based financing supports sound banking practices or creates hidden risks to customers and market integrity. This direction demonstrates that the strengthening of prudential principles is not only doctrinally justified, but also institutionally necessary.

The overall discussion shows that the legal protection of customers in AI based digital financing depends on the ability of banking law to adapt to algorithmic transformation. Existing Indonesian regulations provide important foundations, but they need conceptual integration through a prudential framework that is sensitive to AI risk. The strengthened prudential principle should function as a normative filter for every stage of digital financing, from data collection to credit decision, contract formation, monitoring, complaint handling, and regulatory supervision. This article therefore argues that algorithmic prudence is necessary to ensure that digital financing in Indonesia develops in line with customer protection, responsible innovation, and financial system stability.

## CONCLUSIONS

This study concludes that legal protection for customers in artificial intelligence based digital financing in Indonesia has been normatively recognized, but it remains fragmented across banking law, financial consumer protection, personal data protection, digital banking governance, and alternative credit scoring regulation. The main weakness is not the absence of legal rules, but the lack of an integrated legal framework that connects customer rights with prudential obligations in algorithmic financing decisions. The findings show that AI based financing creates specific legal risks, including opaque scoring, inaccurate profiling, excessive data use, weak decision transparency, and limited customer ability to challenge automated outcomes. Therefore, customer protection must be reconstructed through a strengthened prudential principle that requires banks to govern data, models, human oversight, explainability, and third party technology cooperation as part of responsible financing.

The theoretical contribution of this study lies in the formulation of algorithmic prudence as a legal concept that expands the traditional meaning of banking prudence beyond institutional soundness and financial stability. This concept places customer protection within the core of prudential banking law by treating algorithmic risk as a legal, operational, and reputational risk that must be prevented before harm occurs. From a practical and policy perspective, the study contributes a normative framework for regulators, banks, and financial service actors to align innovation with fairness, accountability, transparency, and customer protection. Its originality lies in integrating banking prudence, financial consumer protection, personal data governance, and AI accountability into a single preventive model for digital financing in Indonesia.

This study is limited to normative legal analysis and does not measure the empirical implementation of AI based financing practices by banks, fintech providers, or alternative credit scoring institutions. It also does not examine customer experiences, supervisory enforcement data, or technical performance of AI models used in financing decisions. Future research should therefore use socio legal or empirical approaches to assess how algorithmic credit assessment operates in practice and how customers experience automated financing decisions. Policymakers should further develop specific regulatory standards on AI governance in digital financing, particularly concerning impact assessment, auditability, explainability, human review, and accessible objection mechanisms for affected customers.

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