

Comparative Study of Arbitration Regulation in Artificial Intelligence (AI) Technology Disputes from the Perspective of Indonesian and European Union Law

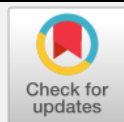
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ABSTRACT

Artificial Intelligence (AI) has generated new forms of technology disputes involving algorithmic opacity, data governance, liability allocation, and cross-border contractual relations. These disputes challenge conventional dispute resolution mechanisms and increase the relevance of arbitration as a flexible, confidential, and expert-oriented forum. This study examines the regulation of arbitration in AI technology disputes from the perspective of Indonesian and European Union law. Using normative legal research with statutory and comparative approaches, it analyses Indonesia's Law No. 30 of 1999 on Arbitration and Alternative Dispute Resolution and compares it with the European Union's AI and digital governance framework. The findings show that Indonesia's arbitration framework remains general and insufficiently prepared for AI-related disputes due to the absence of AI-specific regulation, evidentiary imbalance, limited institutional readiness, and an underdeveloped public policy framework for algorithmic risks. By contrast, the European Union provides more developed substantive standards through the EU Artificial Intelligence Act, the General Data Protection Regulation, and related digital regulations, although it does not establish a specific arbitration regime for AI disputes. This study argues that Indonesia needs adaptive arbitration reform through AI-specific regulation, strengthened arbitral expertise, digital evidence mechanisms, and technology-sensitive arbitration clauses.

Keywords: Arbitration; Artificial Intelligence; European Union Law; Indonesian Arbitration Law; Legal Reform; Technology Disputes

1. Introduction

The rapid development of Artificial Intelligence (AI) has transformed various sectors, including healthcare, transportation, finance, and legal services. AI is no longer understood merely as an experimental technology, but as an autonomous system capable of analysis, prediction, and decision-making without direct human intervention (Cath et al., 2021). Although this transformation has enhanced efficiency and innovation, it has also generated new legal challenges, particularly when AI-driven decisions or actions result in harm, rights violations, or disputes among parties.

The complexity of AI-related disputes poses significant challenges to conventional litigation mechanisms. Court proceedings are often considered inadequate for resolving technology-related disputes that are transnational, technically complex, and frequently involve confidential data, proprietary algorithms, and trade secrets (Schroeder, 2021). In this context, arbitration has emerged as an alternative dispute resolution mechanism valued for its procedural flexibility, efficiency, confidentiality, and capacity to appoint arbitrators with relevant technical expertise. International surveys consistently indicate that arbitration remains the preferred forum for resolving international business disputes, including disputes involving technology and cross-border commercial transactions (Queen Mary University of London & White & Case, 2021).

From the perspective of contract law, arbitration clauses are grounded in the principle of *pacta sunt servanda*, which affirms that agreements made by the parties must be respected and performed in good faith. In Indonesia, this principle is reflected in Law No. 30 of 1999 on Arbitration and Alternative Dispute Resolution, which recognizes the final and binding nature of arbitral awards. However, the law remains general in nature and does not specifically anticipate the distinctive characteristics of disputes arising from AI technologies. This creates a *vacuum legis* in responding to the rapid development of digital law and technology-based dispute resolution.

This regulatory gap has become increasingly relevant as AI-related disputes have emerged in practice. Several international cases demonstrate that AI systems may give rise to legal disputes, including failures of autonomous vehicle autopilot systems, errors in AI-based medical diagnosis, and algorithmic discrimination in recruitment systems (Chander, 2022; Powles & Hodson, 2017). Such disputes raise not only contractual issues, but also broader questions concerning liability, algorithmic bias, data protection, evidentiary standards, and the attribution of responsibility for harm caused by AI systems.

In Indonesia, similar concerns have become visible through the growing number of digital disputes, including personal data breaches and failures in electronic system governance, as reflected in the BPJS Kesehatan data breach and recurring cybersecurity incidents in the e-commerce sector (Nusantara et al., 2024). Although Law No. 27 of 2022 on Personal Data Protection provides a normative basis for data protection, it does not specifically connect AI-related disputes with arbitration mechanisms. As a result, Indonesia's legal framework remains fragmented in addressing the relationship between AI governance, data protection, liability, and dispute resolution.

Against these limitations, arbitration offers particular relevance for AI-related disputes due to its adaptability to cross-border technology disputes. Arbitration allows procedural flexibility, fast-track proceedings, technology-neutral rules, confidentiality safeguards, and the involvement of technical experts as arbitrators or expert witnesses (Born, 2021). In international practice, arbitral institutions such as the International Chamber of Commerce, the London Court of International Arbitration, and the World Intellectual Property Organization have increasingly

responded to technology-related disputes through more specialized procedures and institutional mechanisms.

This development contrasts with the situation in Indonesia, where national arbitral institutions have yet to establish specific rules, specialized panels, or technical guidelines for resolving AI-related disputes. This raises concerns regarding the readiness of Indonesia's arbitration system to respond to the needs of rapidly expanding digital industries, particularly startups, fintech companies, and e-commerce platforms, which frequently operate through cross-border contracts and technology-based transactions (Lew et al., 2003).

By contrast, the European Union has demonstrated more progressive regulatory development. Through the Artificial Intelligence Act, the Digital Services Act, and the Digital Markets Act, the European Union has not only developed a regulatory framework for AI governance, but has also created a broader legal ecosystem that supports more responsive approaches to digital accountability and dispute resolution, including alternative dispute resolution mechanisms (European Commission, 2021, 2022). This demonstrates a stronger integration between technology regulation and dispute resolution design, which remains limited within Indonesia's current legal framework.

These differences reveal a significant regulatory gap that warrants examination through comparative legal analysis. A comparative study between Indonesia and the European Union is relevant not only to identify normative gaps, but also to explore potential reforms in Indonesian arbitration law through a legal transplants approach (Watson, 1993; Zweigert & Kötz, 1998). In this context, the European Union may serve as an important reference for developing an arbitration framework capable of responding more effectively to AI-related disputes.

The urgency of this study is further reinforced by the novel character of AI-related disputes, which often lack established legal precedents. Issues such as liability for algorithmic decisions, the validity of arbitration clauses in AI-based contracts, the disclosure of algorithmic processes, and the use of technically qualified arbitrators require a more progressive legal approach than that applied to conventional commercial disputes. Where positive law remains inadequate, arbitration may provide greater flexibility, including the possibility of resolving disputes through *ex aequo et bono* where permitted by the parties and applicable law (Moses, 2021).

Moreover, arbitration aligns with the principle of *audi et alteram partem*, which ensures that each party has an equal opportunity to be heard. This principle is especially important in AI-related disputes because evidentiary imbalance may arise when one party controls the source code, datasets, model architecture, or technical documentation. In such circumstances, the quality and fairness of arbitral proceedings depend significantly on the tribunal's ability to understand technological complexity and manage evidentiary asymmetry.

From an economic perspective, the readiness of arbitration systems to address AI-related disputes is also closely related to legal certainty and investment attractiveness. Unclear dispute resolution mechanisms may encourage forum shopping, where international business actors prefer foreign arbitral forums that are perceived as more prepared to handle technology-related disputes. Such conditions may weaken national legal competitiveness and reduce investor confidence in Indonesia's digital economy.

Although previous studies have separately examined international arbitration and AI regulation, limited research has specifically connected arbitration regulation with AI-related disputes through a comparative perspective between Indonesia and the European Union. This constitutes the novelty of this research: it analyzes how arbitration regulation in Indonesia may be developed more adaptively to address AI-related disputes by drawing lessons from European legal developments.

Accordingly, this study focuses on two principal issues. First, it compares the regulation of arbitration in AI-related disputes under Indonesian and European Union law. Second, it analyzes the challenges and potential solutions in applying arbitration to resolve AI-related disputes in Indonesia. This study is expected to contribute theoretically to the development of arbitration law and practically to regulatory reform that is more responsive to digital transformation.

Ultimately, reforming arbitration law for AI-related disputes is not merely a technical legal issue, but part of a broader effort to maintain legal certainty, protect parties' rights, and strengthen national competitiveness in the digital economy. Guided by the principle of *salus populi suprema lex esto*, adaptive arbitration reform is increasingly necessary to ensure that law evolves in line with technological innovation and societal change.

2. Literature Review

2.1. Artificial Intelligence and Emerging Legal Risks

Artificial Intelligence (AI) has evolved from a computational concept into a transformative technological infrastructure that increasingly shapes finance, healthcare, logistics, digital commerce, and legal services. Early conceptualizations by John McCarthy defined AI as the science of creating intelligent machines, while contemporary definitions, particularly within the European Union's regulatory framework, emphasize autonomous systems capable of interpreting data, learning from patterns, and adapting their outputs to achieve specific objectives (European Commission, 2021).

Modern AI systems are largely driven by machine learning and deep learning, enabling predictive analytics, natural language processing, automated reasoning, and autonomous decision-making (Russell & Norvig, 2020; Goodfellow et al., 2016). Within business ecosystems, AI contributes to operational efficiency, innovation, and data-driven decision-making. However, it also introduces complex legal risks relating to liability, contractual performance, privacy breaches, intellectual property, consumer protection, and regulatory compliance (Davenport & Ronanki, 2018).

Unlike conventional software disputes, AI-related disputes involve distinctive legal and evidentiary characteristics. First, AI systems often operate through opaque "black box" models, creating difficulties in proving negligence, causation, or fault (Pasquale, 2015). Second, AI's reliance on large-scale datasets may generate disputes involving data ownership, algorithmic bias, privacy violations, and cross-border data transfers (Mantelero, 2018). Third, AI complicates the attribution of legal responsibility because multiple actors may be involved in its development and deployment, including developers, data suppliers, system integrators, platform operators, and end users. This fragmentation makes the allocation of liability more complex than in conventional technology disputes.

These complexities may give rise to disputes involving contractual performance, tort liability, intellectual property, data protection, and regulatory compliance. Such disputes often exceed the capacity of conventional litigation because they are technically complex, transnational, and highly dependent on confidential digital evidence. Consequently, arbitration becomes increasingly relevant as a specialized dispute resolution mechanism for AI-related disputes.

2.2. Arbitration as a Framework for Technology-Related Disputes

Arbitration has historically evolved from informal private dispute settlement into a modern transnational legal mechanism. Contemporary arbitration is grounded in the principles of party autonomy, neutrality, confidentiality, expertise, and finality, all of which make it particularly suitable for high-technology disputes (Born, 2021; Redfern & Hunter, 2015).

The relevance of arbitration for AI-related disputes can be explained through several structural advantages. First, party autonomy enables disputing parties to determine the governing law, seat of arbitration, arbitral institution, procedural rules, language of proceedings, and technical qualifications of arbitrators. This flexibility is essential where disputes involve algorithms, proprietary systems, complex data infrastructures, or transnational digital contracts.

Second, confidentiality is particularly valuable in AI-related disputes, which often involve source code, training datasets, system architecture, trade secrets, and commercially sensitive information. Public court proceedings may expose sensitive business assets, whereas arbitration provides stronger protection through private proceedings and confidentiality-based procedural arrangements.

Third, arbitrators may be selected based on their legal and technical expertise. This is an important advantage over generalist courts, which may lack sufficient familiarity with algorithmic systems, digital evidence, data governance, or AI-specific compliance standards. In disputes involving complex technologies, the quality of adjudication often depends on the tribunal's ability to understand both the legal and technical dimensions of the dispute.

Fourth, the final and binding nature of arbitral awards, reinforced by the New York Convention, provides enforceability across jurisdictions. This feature is particularly important for AI-related contracts, which often involve cross-border transactions, cloud-based services, multinational technology providers, and users located in different jurisdictions.

For these reasons, institutions such as the International Chamber of Commerce, the London Court of International Arbitration, and the World Intellectual Property Organization have increasingly developed procedures suitable for technology-related disputes, including expedited arbitration, expert determination, digital case management, and expert-assisted procedures. These developments indicate that arbitration is not merely an alternative to litigation, but also a flexible legal mechanism capable of responding to the complexity of technology-based disputes.

2.3. European Union Approach to AI and Arbitration

The European Union has emerged as a global leader in AI governance through the development of the Artificial Intelligence Act, which adopts a risk-based regulatory model. This model classifies AI systems into different levels of risk, including unacceptable-risk, high-risk, limited-risk, and minimal-risk systems. Such classification is significant because it links legal obligations to the level of risk posed by AI systems.

This regulatory model has important implications for dispute resolution because compliance obligations may become part of the applicable legal standards in arbitral proceedings. Arbitrators may need to assess whether disputed AI systems comply with regulatory requirements, particularly in high-risk sectors such as healthcare, employment, financial services, public services, and autonomous transport. In this sense, AI regulation does not merely function as an administrative compliance framework, but may also influence contractual interpretation, liability assessment, evidentiary evaluation, and public policy considerations in arbitration.

AI regulation also intersects with public policy concerns relevant to the recognition and enforcement of arbitral awards under the New York Convention. Arbitral awards that potentially legitimize prohibited AI practices or ignore fundamental principles of privacy, fairness, transparency, and non-discrimination may face enforcement challenges. Therefore, AI governance may influence not only the substance of arbitral reasoning, but also the enforceability of arbitral awards.

European Union data protection law, particularly the General Data Protection Regulation, further shapes dispute resolution involving AI. This is especially relevant where disputes concern

unlawful data processing, automated decision-making, profiling, model training, or the use of personal data in AI systems. In these contexts, data protection principles may become essential legal standards for evaluating the legality of AI-related conduct.

Although the European Union does not have a single supranational arbitration law, its member states generally maintain pro-arbitration frameworks aligned with international standards, including UNCITRAL principles. This creates a supportive legal ecosystem for resolving AI-related disputes through arbitration. The strength of the European approach lies not only in arbitration law itself, but also in the broader integration between digital regulation, data protection, fundamental rights, and dispute resolution mechanisms.

2.4. Core Theoretical Frameworks

Several theoretical frameworks support the relevance of arbitration in AI-related disputes. The theory of finality of award emphasizes the importance of binding and non-appealable arbitral awards in ensuring legal certainty and procedural efficiency, particularly in technology sectors where prolonged disputes may hinder innovation (Born, 2021). Party autonomy remains central to arbitration because it allows parties to tailor dispute resolution procedures to technological complexity, including the selection of technical experts, the adoption of specialized evidentiary rules, the determination of applicable law, and the use of confidentiality safeguards (Moses, 2021).

The doctrine of *Kompetenz-Kompetenz* further strengthens arbitration by granting arbitral tribunals the authority to determine their own jurisdiction, thereby minimizing premature court intervention and supporting procedural efficiency in technically complex disputes (Gaillard & Savage, 1999). Confidentiality theory also explains why arbitration is particularly suitable for technology-related disputes involving sensitive proprietary information, such as algorithms, source code, datasets, system architecture, and trade secrets (Redfern & Hunter, 2015).

Beyond classical arbitration theories, risk-based regulation provides an important analytical framework for assessing AI-related legal obligations according to the level of risk generated by the technology. Reflected in the European Union's AI regulatory approach, this theory helps explain how legal duties may vary depending on whether an AI system poses minimal, limited, high, or unacceptable risks (Tegmark, 2017). In addition, accountability and explainability theories are relevant because AI-related disputes often require the allocation of responsibility among developers, providers, users, and other actors involved in the AI lifecycle. Explainability is equally important because arbitral tribunals must be able to understand how algorithmic decisions are produced in order to assess fault, causation, compliance, and liability (Bryson et al., 2017; Goodman & Flaxman, 2016).

These theories show that arbitration is not merely a procedural forum for resolving private disputes. In the context of AI, arbitration may also function as a governance mechanism that combines procedural flexibility, confidentiality, technical expertise, accountability, and regulatory responsiveness.

2.5. Research Gap and Comparative Relevance

Existing scholarship has extensively discussed arbitration and AI governance as separate fields of inquiry. However, limited research has specifically analyzed arbitration frameworks for AI-related disputes through a comparative perspective between Indonesia and the European Union. This gap is significant because Indonesia's arbitration framework remains largely general under Law No. 30 of 1999, while the European Union increasingly integrates AI governance with broader dispute-resolution implications.

Comparative analysis is therefore relevant both theoretically and practically. From a theoretical perspective, it allows the study to examine how arbitration principles interact with AI governance, accountability, explainability, and risk-based regulation. From a practical perspective, it provides a basis for assessing whether Indonesia's arbitration framework is sufficiently prepared to address disputes arising from AI systems.

Using comparative law and legal transplants theory, this study positions European Union developments as a reference point for evaluating whether elements such as risk-based regulation, accountability standards, algorithmic transparency, and technology-sensitive arbitral mechanisms can inform Indonesian legal reform (Zweigert & Kötz, 1998; Watson, 1993).

The literature suggests that arbitration has structural advantages for resolving AI-related disputes. Nevertheless, institutional readiness, regulatory adaptation, and doctrinal development remain underexplored in Indonesia. This study addresses that gap by examining how arbitration can evolve to respond to technology-related disputes in the era of digital transformation.

3. Research Methodology

This study employs normative legal research, also known as doctrinal legal research, which focuses on the examination of legal norms, principles, doctrines, and statutory regulations. This method is used to analyze legal issues concerning the regulation of arbitration in resolving disputes involving Artificial Intelligence (AI) technologies in Indonesia and the European Union. Normative legal research is appropriate for this study because the object of analysis lies in positive law, legal doctrine, and regulatory frameworks, particularly in assessing whether existing arbitration mechanisms adequately respond to legal challenges arising from AI development. This research is doctrinal in nature because it seeks to identify, interpret, evaluate, and compare legal norms within two different legal systems.

This study applies two principal approaches: the statutory approach and the comparative approach. The statutory approach is used to examine relevant legal instruments, including Indonesia's Law No. 30 of 1999 on Arbitration and Alternative Dispute Resolution, Law No. 27 of 2022 on Personal Data Protection, and European legal instruments such as the Artificial Intelligence Act, the General Data Protection Regulation, the Digital Services Act, and the Digital Markets Act. This approach is employed to identify the legal norms governing arbitration, AI governance, data protection, and digital accountability, as well as to assess the extent to which these norms respond to disputes involving AI technologies (Marzuki, 2017).

In addition, the comparative law approach is employed to compare arbitration regulations, legal frameworks, and dispute resolution models between Indonesia and the European Union. This approach aims to identify similarities, differences, regulatory gaps, and the potential adoption of certain concepts or mechanisms for the development of Indonesia's national legal system (Zweigert & Kötz, 1998). Through comparative analysis, this study examines how the European Union has developed a more adaptive legal framework for technology-related disputes and evaluates its relevance for arbitration reform in Indonesia.

The legal materials used in this research consist of primary and secondary legal materials. Primary legal materials include legally binding sources, such as Indonesian legislation on arbitration, personal data protection, and electronic transactions, as well as European Union regulations related to AI, data protection, and digital governance. Relevant international legal instruments and arbitral norms are also examined to understand the broader legal context of cross-border arbitration in AI-related disputes. These primary legal materials form the principal

basis for analyzing the normative construction of arbitration regulation in technology-related disputes (Soekanto & Mamudji, 2001).

Secondary legal materials are used to support the analysis through legal doctrine and academic scholarship. These include books on international arbitration and comparative law, scholarly journal articles on AI regulation and dispute resolution, legal commentaries, institutional reports, and publications from international arbitral institutions such as the International Chamber of Commerce, the World Intellectual Property Organization, and the London Court of International Arbitration. These secondary materials function to explain, contextualize, enrich, and critically assess the primary legal materials in order to produce a comprehensive legal analysis (Ibrahim, 2006; Salim & Nurbani, 2013).

Legal materials were collected through library research and online legal research. Library research was conducted by reviewing books, journal articles, legal documents, statutory materials, and other academic literature relevant to arbitration, AI governance, digital law, and comparative legal studies. This method is central to normative legal research because it enables the systematic examination of legal norms, doctrines, and principles (Soekanto & Mamudji, 2001).

Online legal research was also conducted through credible digital sources, including EUR-Lex for European Union legal instruments, HeinOnline, JSTOR, Google Scholar, and the official websites of international arbitral institutions. The use of online legal research is important to capture current developments in regulation and arbitral practice, particularly because AI-related technology disputes are rapidly evolving and require up-to-date legal analysis (Hutchinson & Duncan, 2012; Bhatia, 2019).

The collected legal materials are analyzed using a descriptive-qualitative method. This method is employed to describe, interpret, and analyze legal materials systematically based on legal theories, arbitration principles, and comparative legal approaches. The analysis focuses on identifying similarities and differences between Indonesia and the European Union in regulating arbitration for AI-related disputes, while also evaluating the strengths, weaknesses, and regulatory gaps of Indonesia's current legal framework.

Through this analysis, the study seeks to formulate recommendations for developing a national arbitration system that is more adaptive to AI-related disputes. The comparative approach is used not only to identify normative differences between Indonesia and the European Union, but also as a basis for proposing legal reforms that are responsive to the needs of dispute resolution in the era of digital transformation.

4. Results and Discussion

4.1. Comparative Regulation of Arbitration in AI-Related Disputes: Indonesia and the European Union

The findings of this study indicate a significant regulatory gap between Indonesia and the European Union in governing arbitration for disputes involving Artificial Intelligence (AI). In Indonesia, arbitration remains primarily regulated under Law No. 30 of 1999 on Arbitration and Alternative Dispute Resolution. The law adopts a general and technology-neutral approach, allowing arbitration to be applied broadly to commercial disputes. Such neutrality provides flexibility, but it does not specifically address the distinctive characteristics of AI-related disputes, including algorithmic opacity, autonomous decision-making, data governance failures, evidentiary asymmetry, and fragmented liability among multiple technological actors.

This gap is significant because, as discussed in the literature review, AI-related disputes differ substantially from conventional commercial or software disputes. AI systems often operate through "black box" models, making it difficult to identify how a particular decision was

produced, who should be held responsible, and what evidentiary standards should be applied (Pasquale, 2015). AI's dependence on large-scale datasets also creates legal risks relating to data ownership, algorithmic bias, privacy violations, and cross-border data transfers (Mantelero, 2018). These characteristics demonstrate that AI-related disputes cannot be treated merely as ordinary contractual disputes. They require a dispute resolution framework capable of addressing technical complexity, digital evidence, accountability, and risk allocation.

Indonesia's arbitration framework has not yet developed substantive standards to assess these risks. Law No. 30 of 1999 provides a general legal basis for arbitration, including party autonomy, finality of awards, and enforceability, but it does not provide specific guidance on algorithmic disclosure, technical documentation, digital evidence management, or AI-related liability. Consequently, arbitral tribunals in Indonesia may face difficulties when evaluating whether an AI system is defective, whether an algorithmic decision is discriminatory, whether a data processing activity is unlawful, or whether responsibility should be allocated to developers, providers, integrators, or users.

By contrast, although the European Union does not maintain a single supranational arbitration code, its dispute resolution ecosystem benefits from the interaction between arbitration and substantive digital regulation. The European Union's Artificial Intelligence Act, General Data Protection Regulation, Digital Services Act, and Digital Markets Act provide broader normative standards relevant to AI-related disputes. These instruments introduce principles and obligations concerning risk classification, transparency, documentation, accountability, data protection, and platform governance. While these regulations do not directly regulate arbitration as a procedure, they provide substantive legal benchmarks that may guide arbitral reasoning in disputes involving AI technologies.

This comparative distinction shows that the difference between Indonesia and the European Union is not merely a difference in arbitration law, but a difference in the legal ecosystem surrounding arbitration. In Indonesia, arbitration operates largely without AI-specific normative benchmarks. In the European Union, arbitration functions within a broader regulatory ecosystem that may inform liability assessment, evidentiary review, contractual interpretation, and public policy considerations. This finding confirms the relevance of comparative law and legal transplants theory, which enables one legal system to identify reform possibilities by examining how another legal system responds to similar legal problems (Watson, 1993; Zweigert & Kötz, 1998). The European Union therefore provides an important reference for Indonesia, not to be transplanted mechanically, but to inform the selective adaptation of principles such as risk-based regulation, accountability, transparency, and documentation.

4.2. AI Regulation as Substantive Support for Arbitration

A central finding of this study is that AI regulation may function as substantive support for arbitration. The European Union's AI regulatory framework does not regulate arbitration procedurally, but it shapes the legal environment within which AI-related disputes may be assessed. This finding strengthens the argument developed in the literature review that arbitration in AI-related disputes cannot rely solely on procedural flexibility. It also requires substantive legal standards capable of guiding arbitral reasoning.

For high-risk AI systems, European Union law imposes obligations relating to risk management, technical documentation, transparency, human oversight, record-keeping, and data governance. These obligations may become relevant evidentiary and compliance standards in arbitration. An arbitral tribunal may assess not only whether a party has breached a contract, but also whether the AI system complied with applicable regulatory obligations. In this respect,

AI regulation strengthens arbitration by providing objective standards for evaluating conduct, fault, causation, and liability.

This finding is closely related to risk-based regulation theory. As discussed in the theoretical framework, risk-based regulation provides an analytical basis for determining legal obligations according to the level of risk generated by a particular technology (Tegmark, 2017). In AI-related arbitration, this theory explains why disputes involving high-risk AI systems require more demanding evidentiary and compliance standards than disputes involving low-risk digital applications. The risk profile of an AI system may therefore influence the scope of disclosure, the standard of care, and the allocation of responsibility among parties.

The contrast with Indonesia is evident. Indonesia has enacted Law No. 27 of 2022 on Personal Data Protection, which provides an important normative basis for data protection. However, Indonesia does not yet have a comprehensive AI-specific regulatory framework equivalent to the European Union's AI Act. As a result, Indonesian arbitral tribunals may lack clear legal standards when assessing whether an algorithm was sufficiently transparent, whether training data were lawfully used, whether automated decisions were explainable, or whether an AI provider had fulfilled appropriate risk management obligations.

This gap also affects evidentiary fairness. In AI-related disputes, essential evidence such as source code, model logs, training datasets, audit trails, and system documentation is usually controlled by AI developers or providers. Without regulatory obligations requiring documentation, auditability, or disclosure, claimants may face serious difficulty proving harm, causation, or fault. This reflects the problem of evidentiary asymmetry discussed in the literature review and reinforces the importance of explainability theory in AI-related disputes (Goodman & Flaxman, 2016).

Another important difference concerns public policy. In the European Union, public policy increasingly incorporates privacy rights, non-discrimination, fairness, transparency, and protection against unlawful automated decision-making. Therefore, arbitral awards that legitimize discriminatory AI practices, unlawful data processing, or prohibited AI systems may face enforcement challenges under the public policy exception in the New York Convention. This demonstrates that AI governance may affect not only arbitral reasoning, but also the recognition and enforcement of arbitral awards.

In Indonesia, public policy in arbitration is still generally understood in more traditional terms, particularly in relation to morality, public order, and mandatory legal norms. It has not yet been sufficiently developed to address algorithmic harms, digital rights, automated discrimination, or systemic opacity. This limits arbitration's corrective capacity in AI-related disputes. From the perspective of accountability theory, this is problematic because arbitration should not only resolve private contractual disputes, but also ensure that responsibility for AI-related harm can be properly identified and allocated (Bryson et al., 2017).

Accordingly, Indonesia needs to develop AI-specific regulation that introduces risk classification, transparency obligations, technical documentation, audit requirements, human oversight, and accountability standards. Such regulation would provide substantive benchmarks for arbitral tribunals when evaluating AI-related disputes. It would also strengthen legal certainty, procedural fairness, and the credibility of arbitration as a forum for resolving disputes in the digital economy.

4.3. Institutional Readiness of Arbitration Systems

The study also finds substantial differences in institutional readiness between European and Indonesian arbitration systems. This finding is important because the effectiveness of arbitration

in AI-related disputes depends not only on legal rules, but also on institutional capacity. As emphasized in the theoretical framework, arbitration derives strength from party autonomy, confidentiality, technical expertise, and finality (Born, 2021; Redfern & Hunter, 2015). However, these advantages can only operate effectively when arbitral institutions have the procedural infrastructure and technical capacity to manage complex technology disputes.

In Indonesia, arbitral institutions remain largely generalist in orientation. There are no dedicated AI dispute guidelines, no specific protocols for algorithmic disclosure, limited digital evidence infrastructure, and limited availability of specialized technology arbitration panels. This creates structural and procedural challenges. Structurally, institutions may lack the tools necessary to manage disputes involving source code, model documentation, data processing records, cybersecurity-sensitive evidence, and expert testimony. Procedurally, tribunals may lack guidance on how to balance confidentiality with disclosure, how to protect trade secrets while ensuring procedural fairness, and how to assess technical evidence in algorithmic disputes.

This condition also creates cultural challenges within arbitral practice. AI-related disputes require not only legal expertise but also sufficient technological literacy. Arbitrators must be able to understand how algorithms operate, how machine learning models are trained, how bias may occur, how automated decisions are generated, and how digital evidence should be evaluated. Without this capacity, arbitration may lose one of its key advantages: the ability to provide expert-based adjudication for technically complex disputes.

By contrast, European arbitral practice has shown greater institutional adaptation to technology-related disputes. Leading institutions such as the International Chamber of Commerce, the London Court of International Arbitration, the Vienna International Arbitral Centre, and the Arbitration Institute of the Stockholm Chamber of Commerce have increasingly adopted digital case management tools, cybersecurity protocols, e-evidence procedures, and expert-oriented dispute management mechanisms. Although these mechanisms are not exclusively designed for AI disputes, they provide institutional foundations that are more compatible with the needs of AI-related arbitration.

This comparative finding confirms that Indonesia's challenge is not merely the absence of AI-specific legislation. The deeper issue is institutional under-preparedness. Even if AI regulation is introduced, arbitration will remain ineffective unless arbitral institutions develop appropriate procedural rules, technical guidelines, expert rosters, cybersecurity safeguards, and training programs for arbitrators. In this respect, institutional readiness becomes a necessary bridge between legal reform and effective dispute resolution.

Theoretically, this finding reinforces the relationship between confidentiality theory and accountability theory. Confidentiality is essential because AI disputes often involve sensitive information, such as source code, datasets, proprietary models, and trade secrets (Redfern & Hunter, 2015). However, excessive confidentiality without adequate disclosure mechanisms may undermine accountability. Therefore, AI-related arbitration requires a careful balance between protecting proprietary information and ensuring that the affected party has a fair opportunity to prove its claim.

For Indonesia, reform should therefore include the development of soft law instruments, AI dispute guidelines, cybersecurity protocols, e-evidence procedures, model arbitration clauses for AI-related contracts, specialized technology arbitration panels, and arbitrator training programs. These institutional reforms would not require abandoning the existing arbitration framework, but would modernize it so that arbitration can respond more effectively to technological complexity.

4.4. Obstacles and Reform Direction for Indonesia's AI Arbitration Framework

The analysis identifies four principal obstacles in Indonesia's current arbitration framework for AI-related disputes: normative vacuum, evidentiary asymmetry, institutional capacity deficit, and an inadequate public policy framework. These obstacles show that the problem is not the inherent incompatibility of arbitration with AI-related disputes, but the insufficient readiness of Indonesia's surrounding legal and institutional ecosystem.

The first obstacle is normative vacuum. Indonesia does not yet have AI-specific technical regulation that establishes legal standards concerning algorithmic transparency, documentation, auditability, explainability, and risk classification. This creates uncertainty for arbitral tribunals because there are no clear substantive criteria for assessing whether an AI system has failed to meet legal or technical standards. Without such standards, arbitrators may be forced to rely primarily on contractual clauses, general principles of liability, or expert testimony, which may be insufficient for complex AI-related disputes.

The second obstacle is evidentiary asymmetry. AI-related disputes often involve evidence that is technically complex and controlled by one party, usually the developer, provider, or platform operator. Source code, model architecture, training datasets, model logs, audit trails, and decision pathways may not be accessible to the affected party. Without disclosure mechanisms, audit rights, or expert-assisted evidentiary procedures, claimants may face serious difficulty proving harm, causation, or fault. This finding is consistent with the literature on black box AI and explainability. Pasquale (2015) emphasizes that algorithmic opacity can obstruct accountability, while Goodman and Flaxman (2016) highlight the importance of explanation in automated decision-making. In the context of arbitration, evidentiary asymmetry may weaken the principle of *audi et alteram partem* because one party may lack a meaningful opportunity to understand and challenge the technical basis of the disputed AI system.

The third obstacle is institutional capacity deficit. Indonesian arbitral institutions have not yet developed specialized infrastructure for e-evidence, algorithmic review, cybersecurity-sensitive proceedings, expert panels, or AI-specific procedural guidelines. This limits the ability of arbitration to function as an expert-based forum for technology-related disputes. Although arbitration theoretically allows parties to appoint arbitrators with technical expertise, this advantage may not be fully realized if institutional rules and arbitral practice remain generalist.

The fourth obstacle is the inadequacy of the public policy framework. Indonesia's public policy doctrine in arbitration has not yet evolved to address AI-related harms such as algorithmic discrimination, unlawful automated decision-making, systemic opacity, or large-scale data misuse. This creates a gap between arbitration and broader digital rights concerns. If public policy remains narrowly understood, arbitral awards involving harmful AI practices may not be adequately scrutinized from the perspective of fairness, accountability, and rights protection.

These findings contribute to arbitration scholarship by showing that AI-related arbitration requires integration between classical arbitration theory and contemporary digital governance theory. Party autonomy and finality remain important for efficiency and certainty, while confidentiality protects sensitive technological information. However, accountability, explainability, and risk-based regulation are necessary to ensure that arbitration does not merely resolve disputes privately, but also supports fairness, transparency, and responsibility in the governance of AI technologies.

Accordingly, Indonesia may selectively adapt European Union best practices through a comparative and legal transplants approach. The most relevant elements for adaptation include risk-based classification, documentation obligations, transparency standards, accountability principles, and safeguards against discriminatory or unlawful AI practices. However, these

principles should be adapted to Indonesia's legal structure, institutional readiness, economic conditions, and digital ecosystem, rather than mechanically copied from the European model.

Overall, the modernization of arbitration law should be viewed as part of broader digital governance reform. Reform should not be limited to procedural adjustment, but should also include substantive AI regulation, institutional capacity building, expert development, and public policy modernization. In this way, arbitration can evolve from a conventional commercial dispute resolution mechanism into an adaptive governance instrument for resolving complex technology-related disputes in the era of Artificial Intelligence.

5. Conclusion

This study concludes that the regulation of arbitration in disputes involving Artificial Intelligence (AI) differs significantly between Indonesia and the European Union, particularly in terms of normative readiness, institutional capacity, and the integration between AI governance and dispute resolution mechanisms. In Indonesia, arbitration remains primarily governed by Law No. 30 of 1999 on Arbitration and Alternative Dispute Resolution, which functions as a general legal framework (*lex generalis*) for resolving commercial disputes. While this framework provides important foundations such as party autonomy, confidentiality, finality of awards, and enforceability, it does not specifically accommodate the technical and legal complexities of AI-related disputes.

The absence of legal standards concerning algorithmic transparency, risk governance, explainability, auditability, technical documentation, and accountability causes AI-related disputes to be treated largely as ordinary contractual disputes, despite their multidimensional technological character. This creates regulatory uncertainty and limits the capacity of arbitral tribunals to assess algorithmic errors, data misuse, automated decision-making, evidentiary asymmetry, or compliance failures. Therefore, the main challenge in Indonesia is not the incompatibility of arbitration with AI-related disputes, but the insufficient readiness of the surrounding legal and institutional ecosystem to support arbitration in this context.

By contrast, the European Union has developed a more mature regulatory ecosystem through the Artificial Intelligence Act, the General Data Protection Regulation, the Digital Services Act, and the Digital Markets Act. Although arbitration is not regulated through a single supranational arbitration code, these instruments provide substantive standards that may indirectly support arbitral adjudication, particularly in disputes involving high-risk AI systems. These standards include risk classification, transparency obligations, documentation duties, human oversight, data protection requirements, and accountability mechanisms. In addition, European arbitral practice has shown greater institutional readiness through the development of technology-oriented procedures, cybersecurity protocols, digital evidence management, and the availability of technical expertise among arbitrators and experts.

The study further identifies several obstacles affecting the implementation of arbitration for AI-related disputes in Indonesia. The first obstacle is normative, as Indonesia does not yet have a dedicated AI regulatory framework capable of providing substantive legal standards for arbitral evaluation. The second obstacle is procedural and evidentiary, particularly the existence of severe information asymmetry between AI developers, providers, or platform operators and affected parties. This problem is exacerbated by the absence of algorithmic disclosure mechanisms, audit obligations, and technical documentation requirements. The third obstacle is institutional, as Indonesian arbitral institutions remain underprepared to manage technologically complex disputes due to limited digital infrastructure, the absence of specialized technology panels, and the lack of AI-specific procedural guidelines. The fourth obstacle concerns public

policy, as Indonesia's public policy doctrine in arbitration has not yet sufficiently evolved to address algorithmic discrimination, unlawful automated decision-making, systemic opacity, and broader digital rights concerns.

These findings demonstrate that arbitration remains potentially suitable for resolving AI-related disputes, but its effectiveness depends on supporting reforms in regulation, institutional design, and technological governance. Theoretically, this study contributes to arbitration scholarship by showing that arbitration in AI-related disputes cannot be understood solely through classical principles such as party autonomy, confidentiality, *Kompetenz-Kompetenz*, and finality of awards. These principles remain important, but they must be complemented by accountability, explainability, risk-based regulation, and comparative law perspectives. In this sense, AI-related arbitration requires an integrated framework that combines procedural flexibility with substantive regulatory standards and institutional readiness.

Based on these findings, Indonesia should strengthen its arbitration framework for AI-related disputes through several strategic measures. First, Indonesia needs to develop a dedicated AI regulatory framework that includes risk classification, algorithmic transparency, technical documentation, audit requirements, human oversight, and accountability standards. Second, core principles reflected in the European Union's AI regulatory framework, particularly explainability, accountability, transparency, and risk governance, should be progressively integrated into existing Indonesian legal frameworks, including personal data protection, consumer protection, electronic transactions, and arbitration law. Third, national arbitral institutions should enhance institutional readiness by developing AI dispute resolution guidelines, digital evidence protocols, cybersecurity safeguards, model arbitration clauses, and specialized technology arbitration panels. Fourth, capacity building for arbitrators should become a priority so that arbitral tribunals are able to assess disputes involving algorithms, data governance, cybersecurity, automated decision-making, and AI-related evidentiary issues more competently and objectively.

While awaiting formal legislative reform, Indonesia may also adopt soft law instruments, including guidelines on algorithmic audits, e-discovery, disclosure standards, and confidentiality safeguards for AI-related disputes. Such instruments may function as transitional mechanisms to reduce legal uncertainty and support gradual modernization. Indonesia may also benefit from the selective adoption of international best practices through a comparative and legal transplants approach. However, such adaptation should not replicate the European model mechanically. Instead, it should focus on principles and institutional practices that are compatible with Indonesia's legal system, institutional capacity, economic conditions, and digital ecosystem.

Ultimately, strengthening arbitration for AI-related disputes should be viewed not merely as reform of dispute resolution law, but as part of broader digital governance reform. Without such development, Indonesia risks regulatory lag, reduced investor confidence, weak procedural fairness, and ineffective protection against emerging harms generated by advanced AI systems. Conversely, by modernizing arbitration law and institutional practice in line with technological development, Indonesia can enhance legal certainty, strengthen digital accountability, and improve its competitiveness in the global digital economy.

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7. Declaration of Conflicting Interests

The authors declare that there are no conflicts of interest related to the research, authorship, and/or publication of this article.

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