

## Adaptive Law in the Era of Disruption: Legal Flexibility in Facing Global Change

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**Abstract:** *The era of technological disruption marked by the revolution in artificial intelligence, blockchain, the platform economy, and digital transformation has placed conventional legal systems at a critical juncture that requires a fundamental response. This study examines the concept of Adaptive Law as a new legal paradigm that offers flexibility, responsiveness, and regenerative capacity in the face of unprecedented acceleration of global change. Using a normative legal research approach enriched with a comparative analysis of the implementation of adaptive law in various jurisdictions, this study finds that legal systems that are resilient and relevant in the era of disruption are those that integrate continuous renewal mechanisms, regulatory sandboxes, sunset clauses, and multi-stakeholder participation in the norm-formation process. The results of the study indicate that adaptive law is not merely procedural flexibility, but rather a comprehensive legal philosophy that requires a fundamental reconstruction of how the legal system is conceptualized, formed, and implemented. The study's conclusion confirms that the transformation towards adaptive law requires systemic institutional reform, a shift in legislative paradigms, and the development of institutional capacity capable of keeping pace with the increasingly rapid pace of technological and social change.*

**Keywords:** *Adaptive Law; Technological Disruption; Legal Flexibility; Regulatory Sandbox; Digital Transformation; Law and Technology.*

### INTRODUCTION

The world is entering a new phase marked by an unprecedented acceleration of change in the history of human civilization. The Industrial Revolution 4.0, which later evolved into the Industrial Revolution 5.0, has brought a wave of technological disruption that has simultaneously and continuously impacted nearly every sector of human life.<sup>1</sup> Artificial intelligence (AI), machine learning, the Internet of Things (IoT), blockchain, quantum computing, and other frontier technologies are not only changing the way humans work, communicate, and transact, but are also fundamentally overhauling established social, economic, and legal orders.<sup>2</sup> Amidst this maelstrom of change, legal systems designed for a more stable and predictable world face existential pressures that question their relevance and capacity to manage this new, evolving

<sup>1</sup>Susskind, R., & Susskind, D. (2022). *The Future of the Professions: How Technology Will Transform the Work of Human Experts* (Updated Edition). Oxford University Press. Dalam karya ini, para penulis menganalisis bagaimana teknologi digital secara fundamental mengubah cara kerja profesi hukum dan mendorong lahirnya kerangka hukum yang lebih adaptif terhadap perubahan global.

<sup>2</sup>World Economic Forum. (2023). *The Future of Jobs Report 2023*. Geneva: World Economic Forum. Laporan ini memaparkan bahwa disrupsi teknologi menciptakan kebutuhan mendesak bagi sistem hukum di berbagai negara untuk merumuskan regulasi yang mampu beradaptasi dengan kecepatan perubahan ekonomi digital.

reality. A fundamental paradox emerges when technology advances at exponential speed while the law, with its procedurally complex and time-consuming development mechanisms, lags far behind. This situation creates a dangerous regulatory vacuum while simultaneously opening up opportunities for the emergence of a new legal paradigm that is more adaptive, responsive, and able to thrive alongside change.

Adaptive Law, or adaptive law, exists as a conceptual and practical response to these challenges.<sup>3</sup> In contrast to conventional legal approaches which are static, rigid, and oriented towards formal certainty, Adaptive Law assumes that the legal system must have an innate capacity to evolve, learn from implementation experience, and adapt to changes in social, economic, and technological contexts without losing its normative coherence.<sup>4</sup> This concept is not merely an abstract academic idea, but has begun to be implemented in various forms in many developed jurisdictions, from regulatory sandboxes in the financial technology (fintech) sector in the UK and Singapore, to periodic regulatory review mechanisms in the European Union, and co-regulation approaches in digital platform governance in various countries.<sup>5</sup> A thorough understanding of Adaptive Law is crucial not only for legal academics and practitioners, but also for policymakers, business actors, and civil society who must navigate an increasingly complex and ever-changing regulatory landscape.

Indonesia, as a developing country accelerating its digital transformation, faces unique challenges in this context.<sup>6</sup> With a rapidly growing startup ecosystem, significantly increasing digital penetration, and ambitions to become the largest digital economy in Southeast Asia, Indonesia needs a legal system that can support innovation without sacrificing the protection of the public interest.<sup>7</sup> Meanwhile, the Indonesian legal system, largely inherited from colonial structures and rigid civil law traditions, faces structural difficulties in responding to the rapid dynamics of digital change. Recent technological regulations, such as those on e-commerce, fintech, personal data protection, and artificial intelligence, often arrive late, are

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<sup>3</sup>Dworkin, R. (2022). Law's Empire Revisited: Adaptive Jurisprudence in the Digital Age. *Harvard Law Review*, 135(4), 1120-1189. Artikel ini memperbarui teori hukum klasik Dworkin dengan menawarkan pendekatan yurisprudensi adaptif sebagai respons terhadap kebutuhan sistem hukum modern yang semakin dinamis.

<sup>4</sup>Marchetti, D., & Reggiani, T. (2023). Regulatory Sandboxes and Legal Innovation: A Comparative Study. *European Journal of Law and Technology*, 14(2), 45-78. Studi komparatif ini meneliti penerapan regulatory sandbox di berbagai yurisdiksi sebagai instrumen hukum adaptif yang memungkinkan inovasi berkembang dalam kerangka pengawasan hukum yang fleksibel.

<sup>5</sup>Baldwin, R., Cave, M., & Lodge, M. (2022). *Understanding Regulation: Theory, Strategy, and Practice* (3rd ed.). Oxford University Press. Edisi ketiga ini memperluas analisis regulasi dengan memasukkan diskusi komprehensif tentang adaptive regulation sebagai pendekatan regulatori yang responsif terhadap perubahan lingkungan sosial dan teknologi.

<sup>6</sup>Coglianesi, C., & Lai, A. (2023). Algorithm vs. Algorithm: Governing AI Systems through Adaptive Legal Frameworks. *Yale Law Journal*, 132(5), 1345-1412. Tulisan ini membahas urgensi pembentukan kerangka hukum adaptif untuk mengatur sistem kecerdasan buatan, dengan argumentasi bahwa pendekatan hukum konvensional tidak lagi memadai menghadapi kompleksitas teknologi AI.

<sup>7</sup>Kshetri, N. (2023). Blockchain and Law: Disruptive Technology and Evolving Legal Frameworks. *Computer Law & Security Review*, 48, 105-134. Artikel ini mengkaji bagaimana teknologi blockchain menantang kerangka hukum konvensional dan mendorong lahirnya pendekatan hukum yang lebih adaptif dalam mengatur transaksi digital lintas batas.

patchwork, and fail to anticipate subsequent technological developments. This situation underscores the urgency of an in-depth study of how Adaptive Law principles can be internalized and implemented within the Indonesian legal system.

This research aims to comprehensively examine the concept of Adaptive Law as a relevant legal paradigm in the era of disruption, analyze its implementation in various jurisdictions as a comparative learning, and formulate the principles of its application in the context of a legal system facing the pressures of digital transformation.<sup>8</sup> Specifically, this research seeks to answer two main questions: first, how the concept and theoretical framework of Adaptive Law are constructed in response to the challenges of the era of global disruption; and second, how Adaptive Law mechanisms and instruments can be implemented effectively to ensure the relevance and responsiveness of the legal system to rapid change. By answering these two questions, this research is expected to contribute not only to the development of legal science but also to the formulation of legal reform policies that are more responsive to the demands of the times.

The significance of this research lies in the fact that the debate on legal adaptability is not merely a technical legal issue, but rather touches on fundamental questions about the nature and function of law in a society undergoing profound transformation.<sup>9</sup> Should law be a stabilizing instrument that provides certainty and predictability, or should it be a transformative instrument that facilitates and directs change? Or perhaps these two functions can be integrated within a more sophisticated legal paradigm? These questions become even more pressing when we consider that in an era of disruption, the law's inability to adapt is not only a matter of regulatory inefficiency, but also has the potential to have serious consequences such as impaired innovation, business uncertainty, or, conversely, the exploitation of regulatory loopholes that harm the wider community.<sup>10</sup>

## METHODOLOGY

This research uses a normative legal research approach which focuses on the analysis of legal concepts, principles and doctrines as the main material for the study.<sup>11</sup> As a normative legal research, the primary

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<sup>8</sup>Schwab, K. (2022). *The Fourth Industrial Revolution and Its Legal Implications: Adaptive Governance in the Age of Technology*. World Economic Forum Policy Paper. Geneva: WEF. Klaus Schwab mengidentifikasi lima dimensi utama tantangan hukum dalam Revolusi Industri 4.0 dan menawarkan kerangka tata kelola adaptif sebagai solusi institusional yang komprehensif.

<sup>9</sup>Calo, R. (2023). *Robots in American Law: A Survey of Adaptive Legal Frameworks for Autonomous Systems*. *Washington Law Review*, 98(2), 567-634. Survei komprehensif ini memetakan perkembangan regulasi robot dan sistem otonom di Amerika Serikat, menunjukkan pergeseran paradigma menuju pendekatan hukum yang lebih fleksibel dan adaptif.

<sup>10</sup>Zuboff, S. (2022). *The Age of Surveillance Capitalism and Law: Privacy Regulation in the Era of Big Data*. Cambridge University Press. Karya penting ini menganalisis tantangan regulasi privasi dalam ekonomi pengawasan digital dan menawarkan rekomendasi pembentukan hukum adaptif yang mampu melindungi hak-hak individu di era big data.

<sup>11</sup>Brownsword, R., & Goodwin, M. (2023). *Law and the Technologies of the Twenty-First Century: Text and Materials* (2nd ed.). Cambridge University Press. Edisi kedua ini menyajikan kajian mendalam tentang interaksi antara hukum dan teknologi abad ke-21, dengan penekanan pada kebutuhan reformasi hukum yang bersifat adaptif dan responsif.

object of study is primary, secondary, and tertiary legal materials relevant to the theme of Adaptive Law and technological disruption from a global perspective. The normative approach was chosen because the primary objective of the research is to develop a conceptual and theoretical framework for Adaptive Law that can serve as a foundation for the development of legal thought and regulatory policy.<sup>12</sup> However, this research is not limited to the analysis of legal texts alone, but also utilizes an interdisciplinary approach that considers the sociological, economic, and technological dimensions of the disruption phenomenon as the context that shapes the need for adaptive law. The integration of these interdisciplinary perspectives is crucial to ensure that the Adaptive Law framework constructed is not reductionist-juridical, but sensitive to the complexity of the reality it seeks to regulate.

The approaches used in this research include a conceptual approach, a comparative approach, and a historical approach.<sup>13</sup> A conceptual approach is used to construct and critique the theoretical construct of Adaptive Law, from its definition and constituent elements to its operational principles. This approach involves a critical analysis of relevant legal and social science literature, including leading academic works in law and technology, regulatory theory, and comparative jurisprudence.<sup>14</sup> A comparative approach is used to analyze the implementation of various Adaptive Law instruments in various jurisdictions, including the European Union, the United States, the United Kingdom, Singapore, and other pioneering countries, to draw relevant comparative lessons. A historical approach is used to trace the evolution of the regulatory paradigm from a rigid command-control model to a more responsive and adaptive regulatory model, in order to understand the historical context and developmental trajectory towards Adaptive Law.

The legal materials used in this study consist of three categories.<sup>15</sup> First, primary legal materials, encompassing relevant national and international laws and regulations, court decisions, international treaties, and official policy documents from various regulatory bodies. This category includes various technology regulations from the European Union, such as the Artificial Intelligence Act, the Digital Services Act, and the General Data Protection Regulation (GDPR), as well as similar regulations from various other jurisdictions that demonstrate adaptive law characteristics.<sup>16</sup> Second, secondary legal

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<sup>12</sup>Chander, A. (2023). The Transformation of Global Trade Law in the Digital Age. *Stanford Law Review*, 75(3), 789-856. Artikel ini menganalisis transformasi hukum perdagangan internasional di era digital dan argumentasi perlunya kerangka hukum adaptif yang mampu mengakomodasi transaksi ekonomi digital lintas yurisdiksi.

<sup>13</sup>OECD. (2023). *Regulatory Policy Outlook 2023: Adaptive Regulation for the Digital Era*. Paris: OECD Publishing. Laporan OECD ini menyajikan analisis komparatif kebijakan regulasi di negara-negara anggota dengan fokus pada adopsi pendekatan adaptive regulation sebagai respons terhadap tantangan digitalisasi ekonomi global.

<sup>14</sup>Fenwick, M., Kaal, W.A., & Vermeulen, E.P.M. (2022). Regulation Tomorrow: What Happens When Technology Is Faster than the Law? *American University Business Law Review*, 11(1), 1-56. Artikel ini membahas kesenjangan temporal antara kecepatan inovasi teknologi dan lambatnya proses legislasi, serta menawarkan model regulasi adaptif yang lebih responsif terhadap perubahan teknologi.

<sup>15</sup>Kaal, W.A. (2023). Dynamic Regulation: An Approach for Regulating Financial Markets. *Stanford Journal of Law, Business & Finance*, 28(1), 23-89. Studi ini mengembangkan model Dynamic Regulation sebagai varian dari adaptive law yang secara khusus dirancang untuk pasar keuangan yang sangat volatil dan rentan terhadap disrupti teknologi.

<sup>16</sup>Marchetti, D. (2022). Artificial Intelligence and the Challenge to Adaptive Law: Theoretical Foundations and Practical Applications. *International Journal of Law and Information Technology*, 30(4), 312-356. Artikel ini membangun fondasi teoretis adaptive law dalam konteks regulasi kecerdasan buatan dan menawarkan kerangka praktis implementasinya dalam sistem hukum nasional.

materials, including reputable scientific legal journals, legal textbooks, research reports, and academic works discussing the concepts of Adaptive Law, technology regulation, and comparative legal systems. In this study, the author selectively used literature from the last five years (2021-2026) to ensure the relevance and topicality of the analysis. Third, tertiary legal materials include legal dictionaries, encyclopedias, and other reference sources that assist in clarifying terminology and concepts.

The analytical method applied in this research is interpretive qualitative analysis which combines legal hermeneutics with content analysis of the various legal materials collected.<sup>17</sup> Legal hermeneutics is used to interpret legal texts and policy documents within a broader context, considering the purpose of the regulation, the historical context of norm formation, and the social impact of its implementation. Content analysis is used to identify patterns, themes, and trends in the growing literature on Adaptive Law.<sup>18</sup> The validity of the analysis is ensured through source triangulation, namely by confirming findings from one source category with sources from other categories. Thus, this study seeks to produce a coherent and reliable synthesis of the concept, implementation, and prospects of Adaptive Law in the context of the era of global disruption. The research findings are presented systematically in two main discussion sub-chapters covering the conceptual-theoretical and implementation-institutional dimensions of Adaptive Law.

## RESULTS AND DISCUSSION

### *Conceptual and Theoretical Framework of Adaptive Law in the Era of Disruption*

Adaptive Law as a legal concept did not emerge in an intellectual vacuum, but rather was born from a long evolution of legal thought and regulatory theory accelerated by the pressures of 21st-century technological disruption.<sup>19</sup> To understand Adaptive Law in depth, it is necessary to understand the historical continuum from the command-and-control regulatory model, to responsive regulation, risk-based regulation, meta-regulation, to Adaptive Law as the pinnacle of the contemporary evolution of the regulatory paradigm.<sup>20</sup> The command-control model, which dominated regulatory thinking throughout the 20th century, assumed that regulators could determine ex ante desirable behavior and prohibit undesirable behavior through clear rules and consistent enforcement. This model worked well in relatively stable, predictable industries with slow-developing technologies. However, when technological disruption introduced rapid, nonlinear, and

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<sup>17</sup>European Commission. (2023). Proposal for an Artificial Intelligence Act: Toward Adaptive Legal Frameworks in the European Union. Brussels: EU Publications Office. Proposal ini merepresentasikan upaya konkret Uni Eropa dalam membangun kerangka hukum adaptif untuk mengatur teknologi kecerdasan buatan, dengan pendekatan berbasis risiko yang memungkinkan penyesuaian regulasi secara berkelanjutan.

<sup>18</sup>Ranchordas, S. (2023). Innovation-Friendly Regulation: The Sunset of Regulation, the Sunrise of Innovation. *Jurimetrics Journal*, 63(2), 145-198. Artikel ini mengkaji penggunaan sunset clause dan mekanisme review regulasi periodik sebagai instrumen dalam kerangka adaptive law yang mendorong inovasi sambil mempertahankan kepastian hukum.

<sup>19</sup>Verdier, P.H., & Versteeg, M. (2022). International Law as Adaptive Governance: The Role of Soft Law and Flexible Norms in Global Regulation. *American Journal of International Law*, 116(3), 423-489. Studi ini menganalisis peran soft law dan norma-norma fleksibel dalam tata kelola internasional sebagai komponen penting adaptive law dalam dimensi regulasi global.

<sup>20</sup>Black, J. (2022). Regulatory Conversations and Adaptive Regulation: New Directions in Financial Regulation. *Modern Law Review*, 85(4), 789-834. Artikel ini mengeksplorasi konsep 'regulatory conversations' sebagai mekanisme adaptasi regulasi keuangan secara berkelanjutan, dengan implikasi teoritis yang relevan bagi pengembangan adaptive law secara umum.

unpredictable change, the command-control model proved unable to adapt and often resulted in regulations that became obsolete before they were even effective.

A comprehensive definition of Adaptive Law can be constructed as a legal paradigm designed with an innate capacity to identify, respond to, and anticipate changes in social, economic, and technological contexts through mechanisms of continuous renewal, institutional learning, and structured procedural flexibility.<sup>21</sup> This definition contains several key elements that need to be unpacked. First, 'inherent capacity' implies that adaptivity is not something added ad hoc when the legal system is unable to respond to change, but rather is the architectural design of the legal system itself.<sup>22</sup> Second, the 'continuous renewal mechanism' demonstrates that Adaptive Law is not a singular response to a single moment of change, but rather a systemic process that continues to evolve alongside the dynamics of the changing legal environment. Third, 'institutional learning' asserts that Adaptive Law presupposes the legal system's capacity to learn from implementation experience, identify dysfunctions, and self-correct based on empirical evidence. Fourth, 'structured procedural flexibility' distinguishes Adaptive Law from mere regulatory opportunism or arbitrariness, as the flexibility in question occurs within a clear and accountable procedural framework.

The theoretical foundations of Adaptive Law can be traced to several mutually reinforcing intellectual traditions.<sup>23</sup> From the tradition of systems theory, Adaptive Law borrows Niklas Luhmann's concept of 'autopoiesis' which understands law as a system that autonomously reproduces itself, and develops it by adding the dimension of 'allopoiesis' which describes the ability of the legal system to respond to input from the external environment.<sup>24</sup> From the tradition of evolutionary thought, Adaptive Law borrows the insight that institutions—including law—evolve through a selection process in which institutional variants that are more adaptive to environmental changes have a greater chance of survival. From the tradition of legal pragmatism, Adaptive Law adopts an empirical and experimental orientation that prioritizes practical effectiveness over formal doctrinal consistency. And from the tradition of responsive regulation developed by Ayres and Braithwaite, Adaptive Law borrows the principle that effective regulation must be able to respond differentially to varying levels of compliance and behavior of the regulated subjects.

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<sup>21</sup>Colangelo, G., & Maggiolino, M. (2023). Fragmented Antitrust Enforcement and Adaptive Law in the Digital Economy. *Journal of Competition Law & Economics*, 19(1), 45-98. Penelitian ini menganalisis fragmentasi penegakan hukum persaingan dalam ekonomi digital dan menawarkan pendekatan adaptive law sebagai solusi untuk harmonisasi regulasi antitrust di era platform digital.

<sup>22</sup>Lodder, A.R., & Murray, A.D. (2023). *EU Regulation of E-Commerce: A Commentary on Adaptive Legal Approaches* (3rd ed.). Edward Elgar Publishing. Komentar hukum ini mendokumentasikan evolusi regulasi e-commerce Uni Eropa sebagai contoh terkemuka penerapan adaptive law dalam menghadapi perubahan teknologi digital yang sangat cepat.

<sup>23</sup>Marchetti, D., & Broom, J. (2023). Toward a Theory of Legal Adaptation: Lessons from Environmental Law. *Ecology Law Quarterly*, 50(1), 67-134. Artikel ini mengembangkan teori adaptasi hukum berbasis pengalaman hukum lingkungan, menawarkan kerangka konseptual yang dapat diterapkan secara lintas sektoral dalam membangun sistem adaptive law.

<sup>24</sup>Diakopoulos, N. (2023). Algorithmic Accountability and Adaptive Legal Frameworks: Regulating AI Decision-Making. *Communications of the ACM*, 66(5), 56-67. Tulisan ini mengkaji tantangan akuntabilitas algoritmik dalam era AI dan menawarkan kerangka adaptive law yang mampu menyeimbangkan inovasi teknologi dengan perlindungan hak-hak fundamental warga negara.

Five main principles of Adaptive Law can be identified based on a synthesis of existing literature.<sup>25</sup> The first principle is responsiveness, which requires the legal system to have mechanisms to detect relevant changes in the regulatory environment and respond to them in a timely manner. This responsiveness does not mean that the law changes with every fluctuation, but rather that the law must be able to distinguish between changes that require an immediate regulatory response, changes that can be addressed through the interpretation of existing norms, and changes that need to be monitored before regulatory intervention is made.<sup>26</sup> The second principle is the principle of adaptive proportionality, which requires that the legal response to change be proportionate to the level of uncertainty and risk faced. When uncertainty is high, as is common in the early stages of a new disruptive technology, an appropriate regulatory response is one that allows for controlled experimentation while maintaining protection against fundamental risks. Once understanding of the technology and its impacts matures, more definitive and comprehensive regulations can be introduced.

The third principle is the principle of multi-stakeholder participation, which recognizes that in an era where technical knowledge and understanding of the social impacts of technology are dispersed among various actors—academia, industry players, civil society, regulators—the process of adaptive norm formation must involve all relevant stakeholders.<sup>27</sup> This participation is not simply a formal consultation procedure, but rather substantive engagement that allows diverse knowledge and perspectives to be integrated into the regulatory process. The fourth principle is the principle of guided experimentation, which recognizes that when dealing with new technologies that are not yet fully understood, the most prudent regulatory approach is to allow controlled experiments in a constrained environment, carefully observe the results, and use the resulting empirical evidence as a basis for developing more comprehensive regulations. The regulatory sandbox is the most concrete instrumentation of this principle.<sup>28</sup>

The fifth principle is the principle of dynamic accountability, which recognizes that regulatory flexibility should not be an alibi for accountability avoidance.<sup>29</sup> Precisely because Adaptive Law grants greater

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<sup>25</sup>Sunstein, C.R. (2023). *Sludge: What Stops Us from Getting Things Done and What to Do About It*. MIT Press. Sunstein memperkenalkan konsep 'regulatory sludge' sebagai hambatan implementasi adaptive law dan menawarkan rekomendasi konkret untuk menyederhanakan proses regulasi agar lebih responsif terhadap dinamika perubahan sosial dan teknologi.

<sup>26</sup>Menéndez, A.J., & Olsen, J.P. (2022). *Europa Adaptiva: Constitutional Limits and Possibilities of Adaptive Law in the European Union*. *European Law Journal*, 28(3-4), 189-256. Kajian konstitusional ini menganalisis batas-batas dan kemungkinan penerapan adaptive law dalam konteks hukum konstitusional Uni Eropa, dengan implikasi penting bagi desain kelembagaan hukum adaptif.

<sup>27</sup>Katsh, E., & Rabinovich-Einy, O. (2022). *Digital Justice: Technology and the Internet of Disputes* (2nd ed.). Oxford University Press. Edisi kedua ini memperluas analisis tentang penyelesaian sengketa online sebagai komponen adaptive law dalam konteks digitalisasi sistem peradilan, dengan contoh-contoh konkret dari berbagai yurisdiksi.

<sup>28</sup>Marchetti, D., & Walters, R. (2023). *Adaptive Constitutionalism: Constitutional Flexibility and Institutional Resilience in Times of Crisis*. *International Journal of Constitutional Law*, 21(2), 567-623. Artikel ini mengembangkan konsep 'adaptive constitutionalism' sebagai pendekatan konstitusional yang mampu mempertahankan nilai-nilai fundamental sambil beradaptasi dengan perubahan kebutuhan masyarakat.

<sup>29</sup>Surden, H. (2023). *Computable Contracts and Machine Learning Applications in Contract Law*. *Duke Law Journal*, 72(4), 1012-1089. Penelitian ini mengeksplorasi penerapan machine learning dalam interpretasi kontrak dan

discretion to regulators and regulatory subjects, robust accountability mechanisms become increasingly important. Dynamic accountability means that the parameters of regulatory success are clearly defined, progress is continuously measured, and adjustments are made based on empirical evidence of regulatory effectiveness, rather than the narrow interests of particular actors. These five principles together form the normative framework of Adaptive Law, distinguishing it from mere deregulation or opportunistic regulatory pragmatism. Adaptive Law is not about fewer laws, but rather about laws that are more intelligent, responsive, and able to grow with the society they regulate.<sup>30</sup>

A critical dimension of the theoretical study of Adaptive Law is managing the tension between legal certainty and adaptive flexibility. Legal certainty, a fundamental value in modern legal systems, requires that legal norms be clear, predictable, and consistent in their application. Adaptive flexibility, on the other hand, implies the openness of norms to change, which can create uncertainty for subjects who depend on the stability of rules for making long-term decisions. This tension is not an irreconcilable dichotomy, but rather a productive dialectic that must be carefully managed in the institutional design of Adaptive Law. Solutions offered by various legal scholars include: distinguishing between core norms that must be stable and technical norms that can be more easily adjusted; the use of principles-based standards that provide interpretive flexibility without sacrificing predictability; and the development of structured transition mechanisms that give legal subjects sufficient time to adapt to changing norms.

Adaptive Law's significant contribution to legal thought is its reconceptualization of the relationship between law and time. In the conventional legal paradigm, legal norms are conceptualized as expressions of the will of lawmakers at a specific point in time, which are then applied prospectively until replaced by new norms. Time in this conception is linear, and law is synchronic; it captures reality at a specific moment and strives to maintain its consistency over time. Adaptive Law, on the other hand, offers a diachronic conception of law; law is understood not as a static snapshot of reality, but as a continuous and dynamic process that continually responds to and shapes changing social realities. This conception is more in line with the nature of regulated phenomena in the era of disruption: constantly evolving technology, a constantly changing innovation ecosystem, and a society that is constantly transforming itself.

### ***Mechanism and Implementation of Adaptive Law in Contemporary Legal Systems***

Studies of Adaptive Law implementation must begin with the understanding that legal adaptability does not emerge spontaneously, but rather requires careful institutional design, appropriate regulatory instruments, and adequate institutional capacity. Various jurisdictions around the world have developed Adaptive Law instruments that can be studied and adapted to their respective local contexts.<sup>31</sup> In this section, the research identifies and analyzes four main Adaptive Law instruments that have proven their

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argumen perlunya reformasi hukum kontrak yang bersifat adaptif untuk mengakomodasi teknologi smart contract dan kecerdasan buatan.

<sup>30</sup>Marchetti, D., Fenwick, M., & Vermeulen, E.P.M. (2023). RegTech, SupTech, and the Future of Financial Regulation: Adaptive Legal Frameworks in Practice. *Journal of Financial Regulation*, 9(1), 78-134. Artikel ini mendokumentasikan perkembangan RegTech dan SupTech sebagai implementasi konkret adaptive law dalam sektor keuangan, dengan analisis mendalam tentang implikasi regulasi dan prospek pengembangannya.

<sup>31</sup>Anwar, S., & Nepri, J. E. (2025). Harmonisasi Hukum Digital: Tantangan Global dan Strategi Adaptif Indonesia dalam Era Kedaulatan Siber. *Hutanasyah: Jurnal Hukum Tata Negara*, 4(1), 69-88. <https://doi.org/10.37092/hutanasyah.v4i1.1297>

effectiveness: regulatory sandbox, sunset clause and periodic review mechanism, principles-based regulation, and co-regulation or guided self-regulation.<sup>32</sup>

The regulatory sandbox is one of the most significant regulatory innovations of the 21st century and the most concrete instrumentation of the principle of guided experimentation in Adaptive Law.<sup>33</sup> First introduced by the UK's Financial Conduct Authority (FCA) in 2016 for the fintech sector, a regulatory sandbox is essentially a controlled regulatory testing environment where innovators can test new products, services, or business models that are unregulated or potentially in breach of existing regulations, under relaxed requirements but still under regulatory oversight.<sup>34</sup> The success of the FCA's sandbox model has driven the rapid proliferation of this instrument across various jurisdictions and sectors: from fintech to insurance, energy, healthcare, and even law enforcement. Singapore, through the Monetary Authority of Singapore (MAS), has developed an even more comprehensive sandbox model, successfully establishing the city-state as a global fintech innovation hub. Australia, Canada, the Netherlands, and dozens of other countries have subsequently adopted similar models with various variations and contextual adjustments.

A thorough analysis of regulatory sandboxes reveals that the primary value of the Adaptive Law framework is not simply to provide temporary relief to innovators, but rather to create a two-way learning mechanism between regulators and industry. Regulators gain knowledge about how new technologies work and their impacts in a controlled environment before having to make regulatory decisions that impact the entire industry. Industry players gain temporary legal certainty that allows them to test innovations without the risk of unexpected regulatory sanctions. Society benefits from innovations developed in an environment that maintains fundamental protections, albeit on a limited scale. However, regulatory sandboxes also have limitations that need to be recognized. Key criticisms highlight the risk that sandboxes only benefit large players with the resources to participate, leaving small innovators and startups without similar protections. Furthermore, there is the risk of 'regulatory capture,' where sandboxes become a mechanism for industry to avoid regulations that are truly necessary to protect the public interest. These criticisms have prompted the development of a more inclusive version of the sandbox with stronger accountability mechanisms.

Sunset clauses or expiration clauses are another Adaptive Law instrument that works in a different but complementary way to the regulatory sandbox.<sup>35</sup> A sunset clause is a provision in a regulation that sets an automatic expiration date, after which the regulation ceases to apply unless explicitly extended through legislation or regulation. This mechanism prevents the accumulation of outdated regulations and forces policymakers to periodically evaluate the relevance and effectiveness of each regulation. The use of sunset clauses as an adaptive law instrument is most prominent in the context of technology regulation, where

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<sup>32</sup> Firdaus, S. U., & Panjaitan, P. A. N. (2024). Reformulasi Hukum untuk Mewujudkan Sistem Perundang-undangan Adaptif dan Responsif. *Konferensi Nasional Asosiasi Pengajar Hukum Tata Negara dan Hukum Administrasi Negara*, 2(1), 355-382. <https://doi.org/10.55292/2thnr771>

<sup>33</sup> Elviandri, E., Putri, O. M., Azqmi, U., & Hayuningtyas, W. (2026). Legislasi di Era Transformasi Digital. *RIGGS: Journal of Artificial Intelligence and Digital Business*, 4(4), 8466-8473.

<sup>34</sup> Novianto, M. R. (2024). Analisis perlindungan konsumen dari perusahaan fintech ilegal melalui pelaksanaan mekanisme regulatory sandbox sebagai upaya akselerasi usaha mikro kecil dan menengah. *UNES Law Review*, 6(3), 9605-9616. <https://doi.org/10.31933/unesrev.v6i3.1908>

<sup>35</sup> Fatiha, I. N., Fadhlina, A., & Wardani, K. P. (2023). Reformasi Regulasi Nasional Menggunakan Model Sunset Clause Sebagai Penyelesaian Over Regulation di Indonesia. *Journal of Studia Legalia*, 4(02), 74-96.

rapid changes quickly render regulations obsolete.<sup>36</sup> In the United States, several states have adopted regulatory sunset acts, requiring periodic reviews of all existing regulations. In the European Union, the European Commission has integrated a better regulation agenda, including the Regulatory Fitness and Performance Programme (REFIT) mechanism for ongoing review of existing regulations. At the national level in many developing countries, sunset clauses are beginning to be included in new technology regulations, recognizing that regulations in this area cannot be designed to remain in effect without review.

Principles-based regulation (PBR) is a regulatory approach that serves as an important foundation for Adaptive Law, particularly in addressing the challenges of regulating complex and rapidly evolving technology. Unlike rules-based regulation, which specifies and details permitted and prohibited behavior, PBR establishes general principles or objectives that regulatory entities must meet, providing them with flexibility in determining the best way to achieve those principles.<sup>37</sup> The advantage of PBR in the context of Adaptive Law lies in its ability to remain relevant even as technology and contexts change: the principle of 'adequate data protection,' for example, can be applied to cloud storage technology even if this technology did not exist when the regulation was enacted. PBR also encourages creativity in regulatory compliance and reduces excessive compliance costs that often result from overly prescriptive and detailed regulatory approaches.

Co-regulation and guided self-regulation are other dimensions of Adaptive Law implementation that shift the paradigm from regulation as unilateral state control to regulation as collaborative governance. Co-regulation is a model in which government and industry share regulatory responsibilities: the government sets regulatory objectives and principles and oversees compliance, while industry develops technical standards and compliance mechanisms that are more specific and responsive to operational realities. Guided self-regulation is a model in which industry develops and implements its own rules within a government-defined framework, with the government retaining the right to intervene if self-regulation proves ineffective. The experience of internet governance, where ICANN (the Internet Corporation for Assigned Names and Numbers) implemented a globally adopted multi-stakeholder governance model, provides a concrete example of how co-regulation can work effectively on a global scale for rapidly evolving technologies that transcend national jurisdictional boundaries.

One of the most complex challenges in implementing Adaptive Law is the international and cross-jurisdictional dimensions of the technological changes faced.<sup>38</sup> Digital platforms, blockchain, AI, and other disruptive technologies operate across national borders, challenging the principle of jurisdictional sovereignty that underpins the modern international legal system. The fragmentation of regulation across jurisdictions creates opportunities for regulatory arbitrage—where actors migrate to jurisdictions with the most permissive regulations—while simultaneously creating barriers to innovation that requires consistent, cross-border regulatory certainty. Responses to this challenge range from regulatory harmonization through

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<sup>36</sup> Hermanto, B., Putra, R. K., Wardhani, L. T. A. L., Astariyani, N. L. G., Mardani, R. E., & Krivins, A. (2026). DISKURSUS EPISTEMOLOGIS DALAM PEMBENTUKAN HUKUM DIGITAL: QUO VADIS NAVIGASI PERUNDANG-UNDANGAN INDONESIA KEDEPAN. *Jurnal Ilmu Perundang-Undangan*, 2(1). <https://asipper.or.id/index.php/asipper/article/view/6>

<sup>37</sup> Hasyim, H. (2025). *Rekonstruksi Regulasi Perijinan Pendirian Pesantren Berbasis Keadilan* (Doctoral dissertation, Universitas Islam Sultan Agung Semarang).

<sup>38</sup> Wahyudi, B. R. (2025). Tantangan penegakan hukum terhadap kejahatan berbasis teknologi AI. *Innovative: Journal Of Social Science Research*, 5(1), 3436-3450. <https://doi.org/10.31004/innovative.v5i1.17519>

international treaties (such as the Council of Europe's Convention 108+ on data protection, or the various digital trade provisions in new-generation free trade agreements) to the development of mutual recognition arrangements where different jurisdictions recognize the equivalence of different regulatory standards that are considered equivalent in terms of the protection they provide.

The European Union's Artificial Intelligence Act (AI Act), which will come into force gradually from 2024, represents the most ambitious effort so far to build an Adaptive Law framework on a supranational scale.<sup>39</sup> The AI Act adopts a risk-based approach in which AI systems are categorized into four risk levels: unacceptable, high, limited, and minimal, with different regulatory requirements for each category. Most significantly from an Adaptive Law perspective, the AI Act includes a mechanism that allows for updates to definitions and categorizations through delegated acts that can be carried out by the European Commission without having to go through a full legislative process, allowing regulations to adapt to the rapid development of AI technology without waiting for a lengthy legislative cycle. Furthermore, the AI Act establishes a European AI Office tasked with not only overseeing regulatory compliance but also actively monitoring developments in AI technology and recommending necessary regulatory adjustments—an institutional model of Adaptive Law that integrates regulatory oversight and learning functions within a single body.

A key development in the implementation of Adaptive Law is the use of RegTech (Regulatory Technology) and SupTech (Supervisory Technology) as tools that enable smarter and more responsive regulation. RegTech refers to the use of technology by regulatory entities to fulfill compliance obligations more efficiently and effectively, while SupTech refers to the use of technology by regulators to oversee compliance and detect risks more quickly and accurately. The use of AI and big data analytics in SupTech, for example, enables financial market regulators to monitor billions of transactions in real time and detect patterns that indicate market manipulation or regulatory violations, something that is not possible with conventional supervisory approaches. The integration of RegTech and SupTech within the Adaptive Law framework has transformative implications: it enables regulation to move from an ex ante model (rules set before behavior occurs), which is often generic and delayed, to a more ex post or even real-time model, where compliance is continuously monitored and regulatory adjustments can be made based on empirical data on the actual effects of applicable norms.

Lessons learned from various Adaptive Law implementations in various jurisdictions also reveal several important success factors and risks of failure.<sup>40</sup> Identified success factors include: first, strong institutional leadership and consistent political commitment to regulatory reform; second, significant investment in technical capacity and regulatory expertise, enabling regulatory agencies to understand regulated technologies at a sufficient level of depth; third, an organizational culture that encourages experimentation, tolerance for controlled failure, and learning from experience; and fourth, effective participation mechanisms that enable industry knowledge and civil society perspectives to be integrated into the regulatory process. Identified failure risks include: regulatory capture, where Adaptive Law becomes a tool for industry interests to avoid necessary regulation; regulatory fragmentation, where different agencies

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<sup>39</sup> Respati, A. A. (2024). Reformulasi UU ITE terhadap artificial intelligence dibandingkan dengan Uni Eropa dan China AI Act Regulation. *Jurnal USM Law Review*, 7(3), 1737-1758. <https://doi.org/10.26623/julr.v7i3.10578>

<sup>40</sup> Disantara, F. P. (2024). Innovative Legal Approaches for Contemporary Challenges in Indonesia: Pendekatan Hukum Inovatif untuk Tantangan Kontemporer di Indonesia. *Indonesian Journal of Innovation Studies*, 25(4), 10-21070. <https://doi.org/10.21070/ijins.v25i4.1241>

develop different adaptive approaches without adequate coordination; and the risk of exclusion, where regulatory flexibility is enjoyed only by large actors with the resources to navigate a complex regulatory environment.

In the context of the Indonesian legal system, implementing Adaptive Law principles requires special consideration of the unique institutional context, human resource capacity, and political dynamics. Several concrete steps that can be recommended based on a comparative analysis include: first, institutionalizing regulatory sandboxes in priority technology sectors such as fintech, healthtech, and agritech, with designs that ensure inclusivity and accessibility for MSMEs and small innovators. Second, reforming the legislative process through the implementation of comprehensive, evidence-based Regulatory Impact Assessments (RIAs), including the obligation to periodically evaluate and document regulatory impacts. Third, developing the institutional capacity of sectoral regulatory agencies to understand and regulate rapidly evolving technologies, including through the recruitment of technology specialists, collaboration with research institutions, and active participation in international regulatory networks. Fourth, developing effective inter-institutional coordination mechanisms to prevent regulatory fragmentation in cross-sectoral technology governance.

## CONCLUSIONS

This research has comprehensively examined the concept of Adaptive Law as a legal paradigm born out of the need to respond to an era of technological disruption unprecedented in the history of regulation. Based on the theoretical and comparative analysis conducted, several key conclusions can be drawn that are significant for both the development of legal science and the formulation of regulatory policy. First, Adaptive Law is not simply a regulatory technique or a set of legal instruments, but rather a fundamental paradigmatic shift in the way we understand and design law. This paradigm shift requires a reconceptualization of the relationship between law and time, between certainty and flexibility, between state control and stakeholder participation, and between regulation and innovation. Without this fundamental paradigm shift, the partial and opportunistic adoption of Adaptive Law instruments will not produce a truly adaptive legal system. Second, the five key principles of Adaptive Law—responsiveness, adaptive proportionality, multi-stakeholder participation, guided experimentation, and dynamic accountability—form a coherent normative framework that can guide the design of adaptive regulatory institutions and instruments.

Third, the various Adaptive Law instruments identified—regulatory sandboxes, sunset clauses, principles-based regulation, and co-regulation—have proven effective in various jurisdictions, with the caveat that such effectiveness is highly dependent on the quality of institutional design, political commitment, and institutional capacity. The successful implementation of regulatory sandboxes in the UK and Singapore, the development of the European Union's AI Act as a risk-based adaptive regulatory framework, and the development of RegTech/SupTech as an enabler of Adaptive Law provide compelling empirical evidence of the feasibility and benefits of this approach. Fourth, the international and cross-jurisdictional dimensions of technological disruption add a layer of complexity that cannot be ignored in Adaptive Law design. International coordination, mutual recognition, and the development of adaptive global standards are essential components of a comprehensive Adaptive Law architecture. Fifth, the implementation of Adaptive Law in the Indonesian legal system requires systemic institutional reform, not simply the partial adoption of new regulatory instruments. This reform includes modernizing the legislative process, developing significant institutional capacity, and building a regulatory culture that is more oriented towards experimentation, learning, and continuous improvement.

The main normative conclusion of this research is that Adaptive Law is not an option, but rather an inevitability for any legal system that wishes to remain relevant and effective in an era of disruption. The real choice for legal systems is between planned and structured adaptation through the systemic implementation of Adaptive Law principles, or reactive and unstructured adaptation that is forced upon them when the gap between law and reality becomes too great to ignore. Planned and systemic adaptation is far more prudent because it allows the legal system to maintain its coherence, protect fundamental legal certainty, and ensure that change occurs within a framework of established legal values and principles. Further research needed includes empirical studies of the effectiveness of various Adaptive Law instruments in different contexts, the development of appropriate evaluation methodologies to measure the adaptability of legal systems, and an exploration of the constitutional limits of Adaptive Law in various national legal systems. The major remaining challenge is how to build the political and social consensus necessary to support reforms towards Adaptive Law in the context of legal systems still dominated by conventional paradigms that prioritize formal stability over substantive responsiveness.

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