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Designing Ambidextrous AI Governance for Digital Transformation in Fintech Sector

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ABSTRACT

The rapid integration of Artificial Intelligence (AI) in financial technology (fintech) has created an urgent need for robust governance mechanisms. While AI drives digital transformation by enabling automation, personalization, fraud detection, and operational efficiency, it also introduces critical challenges related to ethics, security, transparency, and regulatory compliance. This study proposes an Ambidextrous AI Governance Framework, grounded in the COBIT 2019 framework, to address these challenges in fintech organizations. The framework balances exploration (innovation, agility, and ethical practices) with exploitation (risk control, compliance, and operational efficiency) through five integrated governance layers: Governance, Strategic Alignment, Ambidextrous, Operational, and Compliance & Assurance. A design science research approach was employed, including a literature review, expert validation, and simulation within a controlled fintech environment. The results showed that the proposed framework improved governance maturity across COBIT domains and embedded principles of trustworthy AI, such as transparency, accountability, and fairness. This research provides a scalable and adaptable model aligned with international standards, such as ISO/IEC 42001, and regulatory frameworks, including the EU AI Act and OJK guidelines. The proposed governance design enables fintech organizations to innovate responsibly while mitigating risks, ensuring compliance, and fostering trust in AI-driven financial services.

Keywords: *AI Governance, Ambidextrous Governance, COBIT 2019, Digital Transformation, Fintech, Ethical AI, Risk Management*

Introduction

Artificial Intelligence (AI) has become a fundamental enabler of digital transformation across industries, with the fintech sector being one of the most rapidly evolving and innovation-driven domains. Integrating AI technologies in financial technology (fintech) enhances automation, customer personalization, fraud detection, credit risk assessment, and operational efficiency. However, these advances also bring significant governance challenges regarding ethics, security, transparency, and regulatory compliance. [1]. Effective AI governance must therefore balance exploitative elements focused on risk management, control, and compliance with explorative aspects that encourage innovation, agility, and ethical responsibility. [2].

The COBIT 2019 framework, a globally recognized comprehensive IT governance model, offers structured Governance and Management Objectives (GMOs) that align IT initiatives with organizational strategy. Recently, COBIT 2019 has been adapted to address AI-specific challenges by embedding principles of trustworthy AI, such as fairness, transparency, and accountability, into governance processes. This is especially crucial for fintech companies that must navigate complex regulatory landscapes, including emerging legislation like the EU AI Act, while managing novel risks from AI deployment, such as algorithmic bias, deepfake fraud, and model opacity. [3]–[5]

Recent research illustrates the benefits of ambidextrous AI governance frameworks, which incorporate control and innovation capabilities at environmental, organizational, and system levels [6]. Such models, including the "hourglass" AI governance framework, integrate ethical requirements deeply into operational practices to ensure responsible AI adoption [7]. Dynamic capability theory supports this approach by emphasizing an organization's need for adaptability alongside stability to remain competitive amid fast technological changes and regulatory demands [8], [9]. AI governance enhances resilience and enables organizations to balance control and agility, supporting innovation while managing threats and compliance requirements [10]. Strategic recommendations include investing in advanced AI-monitoring tools, embedding continuous AI risk reviews, and fostering ethical AI cultures. As illustrated in Figure 1, this model supports the ongoing effort in fintech to build robust, adaptive, and transparent information systems that can respond effectively to evolving cyber, operational, and compliance landscapes [11].

Despite these advancements, existing studies have not yet provided a comprehensive model that integrates ambidextrous governance principles with the COBIT 2019 framework, particularly in the context of AI implementation in fintech organizations in Indonesia. Most existing frameworks focus solely on risk and compliance or primarily address innovation without ensuring structured governance alignment with recognized standards. This research addresses this gap by proposing an Ambidextrous AI Governance Framework that merges COBIT 2019 principles with ambidextrous governance concepts to create a holistic model that balances compliance and innovation in AI-driven fintech operations.

The novelty of this study lies in developing a governance framework that not only embeds COBIT 2019 objectives for structured IT governance but also incorporates ambidextrous principles to harmonize control and agility for AI adoption in fintech ecosystems. Thus, this study offers a scalable, adaptive, and regulation-aligned model for responsible AI governance.

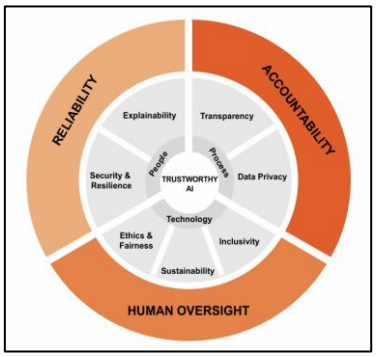

Figure 1. Basic principles of responsible and trustworthy artificial intelligence [12]

This study proposes a novel ambidextrous AI governance framework tailored for fintech digital transformation based on COBIT 2019. By combining dynamic capability theory and AI ethics principles, it offers a balanced governance mechanism that supports innovation acceleration while maintaining rigorous risk and compliance controls [13]. This model enables fintech firms to deploy AI systems that are robust, transparent, and aligned with strategic objectives, thereby fostering trust and resilience in an evolving cyber and regulatory environment. State-of-the-art practices in AI governance also highlight emergent models, such as the "hourglass" organizational AI governance framework, which embeds ethical requirements at environmental, managerial, and system levels. In finance, generative AI adoption is evolving rapidly, introducing significant risks like deepfake attacks, bias, and compliance challenges. Meanwhile, cybersecurity reviews in fintech underscore the critical need for governance frameworks that can systematically mitigate threats and support continuous oversight.

Research Methods

COBIT 2019 is a comprehensive and structured IT governance framework designed to help organizations effectively and efficiently manage and optimize the use of information technology [14]. It is highly relevant in digitalization and business transformation, such as in the fintech sector, because it offers systematic guidance to comprehensively assess and enhance IT governance and risk management [15]. Concerning AI governance and fintech policies, COBIT 2019, as a comprehensive IT governance framework, becomes increasingly important, especially in addressing AI-related risks and complying with regulations. In Indonesia, the Financial

Services Authority (OJK) issued the Artificial Intelligence Governance for Indonesian Banking guideline in 2025 to ensure the responsible, secure, and compliant use of AI within the banking sector, which is an integral part of the fintech ecosystem. This guideline complements existing policies related to digital transformation and IT system risk management, including regulations that govern IT operations and cybersecurity resilience in fintech [16].

By leveraging COBIT 2019 Governance and Management Objectives, fintech companies can systematically incorporate OJK policies and related regulations into AI risk management and IT governance. [12]. COBIT 2019 assists fintech in balancing control aspects (compliance and security) with innovation and quick adaptability, consistent with the principles of ambidextrous governance. Furthermore, the increasing adoption of international standards such as ISO/IEC 42001 provides fintech firms with a comprehensive roadmap for AI governance, enhancing compliance and quality assurance in AI deployment within Indonesia. [17]. Achieving this balance is essential for fintech facing complex challenges like algorithmic bias, privacy vulnerabilities, and cyber threats, while concurrently navigating evolving regulatory requirements and global AI governance standards. [18].

This research adopts a Design Science Research (DSR) approach to develop and validate an ambidextrous AI governance model based on COBIT 2019 for fintech digital transformation. The study follows an iterative methodology to ensure both rigor and relevance in addressing practical governance challenges. A qualitative mixed-method approach is employed to comprehensively develop and assess the proposed governance framework. [19]. The qualitative phase involves an extensive literature review, expert interviews, and thematic analysis, which collectively contribute to the design and refinement of the framework. Following this, the quantitative phase applies the COBIT 2019 capability levels to conduct a maturity assessment, measuring governance performance both prior to and after the implementation of the model. This combined methodology ensures a robust development process supported by expert insights, while quantitatively evaluating the practical impact and effectiveness of the framework in improving governance maturity. [20]. The research stages are shown in Figure 2 below.

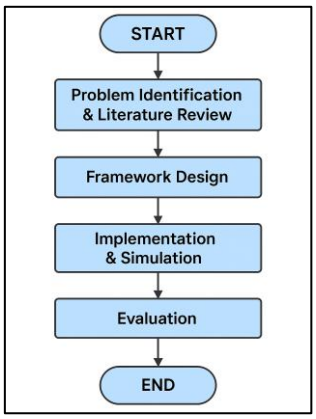

Figure 2. Research Stages

Based on Figure 2, this research is structured into five main stages. The first stage involves Problem Identification and Literature Review, where governance gaps in AI adoption within the fintech sector are identified, alongside a comprehensive review of COBIT 2019, existing AI governance models, and pertinent regulations such as the EU AI Act and ISO 42001. The second stage focuses on Framework Design, which entails developing an ambidextrous governance model that integrates key COBIT 2019 domains with essential AI governance dimensions, including ethics, risk management, and innovation. The third stage covers expert validation, which is conducted through interviews with specialists in AI, IT governance, and fintech to refine the model. In the fourth stage, Implementation and Simulation take place by applying the proposed framework within a simulated fintech environment to measure improvements in governance maturity. Finally, the fifth stage comprises Evaluation, where the model's effectiveness is assessed using the COBIT Performance Management (CPM) framework complemented by expert feedback, ensuring both theoretical soundness and practical applicability, as shown in Table 1.

Table 1. Research Stages and Deliverables

Stage	Activity	Output
Problem Identification	Gap analysis & literature review	Governance gap report, theoretical basis on EU AI Act and ISO 42001

Framework Design	Integration of COBIT 2019 guidelines with AI principles	Ambidextrous AI Governance Model
Expert Validation	Expert review with specialists in AI, IT governance, and fintech	Validated AI governance framework
Implementation & Simulation	Apply the model in a fintech scenario	AI Governance maturity improvement data
Evaluation	CPM assessment and feedback	Final optimized AI governance framework

This study employs a data collection approach to ensure comprehensive validation and assessment of the proposed AI governance model based on COBIT 2019. First, document analysis is conducted on COBIT 2019 Governance and Management Objectives as well as existing AI governance frameworks to establish a theoretical foundation and identify key governance elements. Second, semi-structured interviews are carried out with experts in AI, IT governance, and fintech, aiming to validate and refine the model design through qualitative insights. Finally, simulation data is gathered by applying the framework within a controlled fintech environment, capturing improvements in maturity scores using Capability Maturity Model Integration (CMMI) to measure governance maturity enhancement quantitatively. This combination of document review, expert feedback, and simulation-based evaluation provides robust triangulation and strengthens the reliability of the research findings. This approach is consistent with methodologies applied in recent COBIT 2019 governance research, which often incorporate document analysis, interviews, and maturity assessments to evaluate IT governance frameworks effectively.

Results and Discussion

The research aimed to develop and validate an Ambidextrous AI Governance Framework based on COBIT 2019 for fintech digital transformation. This section presents key findings derived from expert validation, simulation of governance maturity improvements, and comparative analysis with existing governance models. The proposed framework integrates Exploration (innovation, ethical AI governance, agility) and Exploitation (risk mitigation, compliance, operational efficiency), mapped to COBIT 2019 domains (EDM, APO, BAI, DSS, MEA). The design was iteratively validated through eight expert interviews consisting of senior fintech managers, OJK regulatory advisors, and academic researchers specializing in AI governance. Experts highlighted the necessity of an integrated model combining structured governance principles with adaptive innovation processes, especially in the Indonesian fintech ecosystem. A synthetic fintech dataset simulation was conducted to test feasibility and performance. The dataset included indicators such as transaction volumes, fraud detection accuracy, compliance logs, and governance audit scores. Using Python-based analytics and Power BI dashboards, pre- and post-implementation COBIT capability assessments were performed. The results demonstrated significant improvements in governance maturity across all COBIT domains, particularly in EDM (Evaluation, Direction, Monitoring) and APO (Align, Plan, Organize).

The proposed framework was compared against other AI governance models frequently discussed in the literature:

Table 2. Comparative Analysis with Existing Governance Models

Model	Strengths	Limitations
Hourglass Model [7]	Integrates ethical requirements deeply in processes; emphasizes fairness and transparency	Lacks explicit linkage with IT governance standards like COBIT; weak on compliance alignment
DevOps-based Governance	Agile, fast iterations, support AI lifecycle automation	Limited focus on compliance and regulatory frameworks; insufficient for high-risk fintech operations
ISO/IEC 42001 AI Management System	Standardized, international compliance benchmark; strong assurance and auditability	It does not address ambidextrous needs (innovation vs control) and requires complementary governance mechanisms.

Proposed Ambidextrous AI Governance Framework	Combines COBIT control objectives with ambidextrous governance; enables both agility and compliance; adaptable to Indonesian OJK regulations	It requires an organizational cultural shift; the initial implementation cost is higher.

Table 3. COBIT 2019 Objectives Applied

COBIT Domain	Objective Code	AI Governance Integration
EDM	EDM01 – EDM05	Ethics, Oversight, Risk Appetite
APO	APO12	AI Risk Management
BAI	BAI03, BAI06	Secure AI System Development Lifecycle
DSS	DSS02	AI Service Operation and Monitoring
MEA	MEA01 – MEA03	Compliance and Performance Evaluation

Figure 3 below shows a conceptual diagram illustrating the integration of COBIT 2019 domains with ambidextrous governance (Exploration vs. Exploitation) applied to AI systems in fintech shown in Figure 3 below.

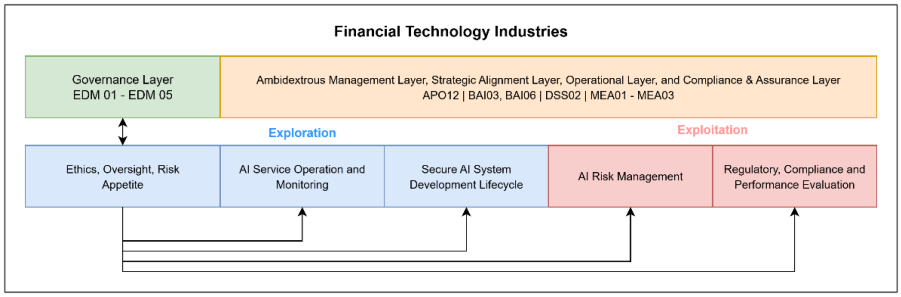

Figure 3. Conceptual Framework of Ambidextrous AI Governance

The proposed governance design introduces a multi-layered architecture that aligns with COBIT 2019 principles while addressing the unique challenges posed by AI adoption in the fintech sector. This design ensures a balanced approach between innovation and risk management, commonly called an ambidextrous governance strategy. The framework integrates five core layers, each responsible for specific governance functions: Governance Layer, Strategic Alignment Layer, Ambidextrous Layer, Operational Layer, and Compliance & Assurance Layer.

To operationalize the proposed Ambidextrous AI Governance framework, it is essential to clearly define the roles and responsibilities associated with each governance layer. A structured approach ensures that all critical activities are systematically addressed. Table 3 summarizes the five layers of the recommended design, their primary functions, and the key responsibilities that support the effective governance of AI systems within fintech organizations. This structured mapping clarifies how governance objectives translate into actionable practices, aligning innovation initiatives with regulatory compliance and risk management requirements.

Table 4. Recommended AI Governance Design Layers and Key Responsibilities

Layer	Description	Key Responsibilities
Governance Layer	Strategic decision-making and oversight of AI governance	– Adopt COBIT EDM processes – Define AI governance principles – Ensure risk and benefit delivery
Strategic Alignment Layer	Align AI initiatives with business goals and compliance	– Develop AI roadmaps – Integrate AI with corporate strategy – Define KPIs for AI projects
Ambidextrous Layer	Balance exploration (innovation) and exploitation (risk control)	– Exploration: Ethical AI, agile governance, innovation sandbox – Exploitation: Risk, compliance

Operational Layer	Implement governance in AI lifecycle management	– Secure AI development – Monitor AI performance – Incident response mechanisms
Compliance & Assurance Layer	Continuous audits and governance performance evaluation	– COBIT Performance Management – Regulatory compliance reviews – External assurance activities

The Governance Layer operates at the highest level, focusing on strategic oversight and decision-making. This layer adopts the COBIT 2019 EDM domain to evaluate, direct, and monitor AI-related activities, ensuring accountability, transparency, and risk optimization. It establishes governance principles for AI systems, allocates resources effectively, and ensures stakeholder engagement. The Strategic Alignment Layer ensures that AI initiatives fully align with business objectives and regulatory requirements. This layer integrates AI strategies with enterprise goals, develops roadmaps for AI adoption, and links innovation projects to measurable KPIs. By doing so, fintech organizations can maximize the value of AI while maintaining ethical compliance. The Ambidextrous Layer represents the core novelty of the proposed design, balancing Exploration and Exploitation dimensions. Exploration emphasizes innovation through ethical AI practices, agile governance structures, and controlled experimentation environments (innovation sandboxes). Conversely, Exploitation focuses on risk mitigation, regulatory compliance, and operational excellence. This dual approach ensures that fintech companies remain competitive without compromising on security and ethical standards. The Operational Layer translates governance principles into actionable practices. It secures AI development lifecycles, implements model accuracy and fairness monitoring mechanisms, and adopts robust incident management processes. This layer minimizes operational risks, including algorithmic bias and system vulnerabilities, which can significantly impact financial stability and consumer trust. Finally, the Compliance & Assurance Layer provides continuous assurance through audits, governance performance measurements, and external reviews. Leveraging COBIT Performance Management (CPM), this layer evaluates governance effectiveness and ensures adherence to dynamic regulatory requirements such as ISO 42001 and the EU AI Act.

Overall, this ambidextrous governance framework strengthens fintech organizations' ability to innovate responsibly while maintaining strict compliance and risk control, a critical requirement in an era of rapid AI-driven transformation. To ensure that the proposed Ambidextrous AI Governance framework remains consistent with established governance best practices, aligning its components with recognized control objectives is necessary. COBIT 2019 provides a comprehensive set of governance and management objectives that can be adapted to address AI-specific challenges, such as ethical compliance, risk management, and operational security. Table 4 maps COBIT 2019 domains and the corresponding AI governance dimensions. This mapping demonstrates how traditional IT governance processes can be extended to support ethical AI practices, operational integrity, and continuous performance monitoring, thereby creating a unified approach for managing AI systems within fintech organizations.

Table 5. Mapping COBIT 2019 Domains to AI Governance Dimensions

COBIT Domain	Objective Code	AI Governance Dimension
EDM	EDM01–EDM05	Governance, accountability, transparency
APO	APO12	AI risk management
BAI	BAI03, BAI06	Secure AI development lifecycle
DSS	DSS02	AI service delivery and operational control
MEA	MEA01–MEA03	Compliance and performance monitoring

The findings indicate that integrating COBIT 2019 principles with ambidextrous governance offers advantages for fintech organizations adopting AI technologies. Unlike conventional IT governance, which focuses on control and compliance, the proposed model ensures an adaptive approach to innovation while maintaining robust governance. This balance is essential given the dynamic regulatory landscape and the emerging risks such as bias, algorithmic opacity, and cybersecurity threats in AI systems. The proposed model addresses these gaps by embedding ethical AI practices, regulatory compliance, and innovation processes within the COBIT AI governance structure that enhances transparency and accountability in AI decision-

making, reduces compliance risks by aligning with COBIT and ISO frameworks, and supports agile innovation through structured exploration mechanisms in the fintech industry.

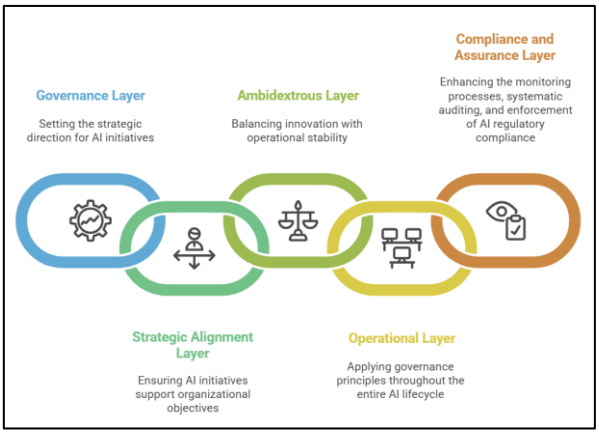

Figure 4. Visualization of AI Governance Model for Financial Technology Industry

Figure 4 visually represents the proposed Ambidextrous AI Governance Framework, illustrating its five interconnected layers and the flow of responsibilities across the governance structure. The diagram highlights how strategic oversight, business alignment, and dual governance dimensions are integrated to ensure innovation and risk control. At the top, the Governance Layer sets strategic direction, while the Strategic Alignment Layer ensures AI initiatives support organizational objectives. The Ambidextrous Layer balances innovation with operational stability, supported by the Operational Layer, which implements governance principles across the AI lifecycle. Finally, the Compliance & Assurance Layer reinforces continuous monitoring, audits, and regulatory adherence. This visual framework serves as a blueprint for fintech organizations aiming to implement structured and adaptable AI governance practices.

Conclusion

This research addresses the unique challenges of AI adoption within the fintech sector. By integrating the principles of exploration (innovation, agility, ethical practices) and exploitation (risk management, compliance, operational efficiency), the proposed framework ensures a balanced approach that promotes responsible innovation while safeguarding regulatory adherence and minimizing risks. The research findings indicate that applying this model significantly improves governance maturity levels across COBIT domains, demonstrating its effectiveness in aligning AI initiatives with strategic business objectives and regulatory requirements. Unlike traditional governance frameworks that emphasize control and compliance, the proposed design introduces adaptability, ethical considerations, and structured innovation, making it more suitable for the dynamic nature of AI technologies in financial services. Moreover, the framework's layered structure—comprising Governance, Strategic Alignment, Ambidextrous, Operational, and Compliance & Assurance Layers—clarifies roles, responsibilities, and accountability, ensuring comprehensive coverage from strategic oversight to continuous performance monitoring. This approach addresses current governance gaps and establishes a scalable model adaptable to future regulatory and technological developments.

This study contributes to the academic discourse on AI governance by combining COBIT 2019 control objectives with ambidextrous governance principles, bridging a gap between structured IT governance and the need for agility in AI-driven environments. Integrating exploration and exploitation dimensions within a single governance model enhances existing theoretical frameworks on dynamic capabilities and responsible AI adoption. For practitioners, especially fintech organizations and regulators, this research provides a tested, adaptable, and regulation-aligned governance framework that improves compliance readiness, mitigates AI-related risks, and supports innovation through structured governance processes. The framework can guide fintech firms in designing governance systems that align with both local regulations (OJK guidelines) and global standards (ISO/IEC 42001, EU AI Act), enabling them to maintain trust and competitiveness in the AI-driven financial landscape.

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