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# The Intersection of AI and Blockchain for Enhanced Financial Due Diligence

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**Abstract:** Financial due diligence (FDD) plays a crucial role in corporate finance and mergers and acquisitions, because it is traditionally hampered by inefficiencies, human mistakes, and fractured verification mechanisms. The review examines how Artificial Intelligence (AI) can be used in combination with blockchain to increase automation, transparency, and accountability in financial investigations. Its main task is to examine how predictive analytics, anomaly detection, and immutability options of AI can reduce the level of human bias, speed up decision-making, and enhance compliance assurance. Using two prominent case studies of JPMorgan Chase and Wells Fargo, the study compares successful and unsuccessful integrations to determine what makes integrations effective. JPMorgan Liink platform showed considerable improvements in efficiency such as cross-border payment latency went down by 70% whereas the project at Wells Fargo was terminated because it failed in its governance and interoperability. Results indicate that AI-blockchain implementation boosts the integrity of financial data, automates risk assessment, and is helpful in creating auditability in real-time. But still, scalability, explainability, regulatory harmonization, and privacy concerns remain limited. The research concludes that long-term implementation needs permission blockchain systems, explainable AI, strong rules of governance, and convergence of regulation. Financial due diligence can be a proactive, resilient, and data-driven compliance system implemented in the future through transparency and ethical oversight and a federated learning process.

**Keywords:** Artificial Intelligence; Blockchain, Financial Due Diligence; Risk Assessment; Fraud Detection.

## INTRODUCTION

Financial due diligence (FDD) is a fundamental component of corporate finance and mergers and acquisitions (M&A), which represents a strict procedure to assess investment soundness, compliance integrity, and risk exposure (Ayodeji *et al*., 2025). Historically, FDD used manual verification and fragmented documentation and subjective expert interpretation, which, in most cases, cause inefficiencies, delays, and human error (Asamoah *et al*., 2025; Sharma *et al*., 2024). The growing number of complex types of financial crime schemes, including money laundering, fraud, and cybersecurity threats, has made such constraints more problematic, exacerbating the necessity of more powerful, automated, and transparent due diligence frameworks (Ahmed, 2025).

New technologies, especially blockchain and Artificial Intelligence (AI), have emerged with transformative solutions to these challenges. With due diligence, AI uses deep learning (DL), machine learning (ML), and natural language processing (NLP) to comprehend unstructured financial reports and identify anomalies and find a predictive risk score (Roy *et al*., 2024). These functions will accelerate the operations of the investigation and help identify subtle patterns of risk that are sometimes missed by people who evaluate them by hand (Sharma *et al*., 2024). Simultaneously, blockchain presents a decentralized, non-tamperable entry system that would grant the secure, auditable, and verifiable exchange of transactional and historical information between stakeholders (Ahmed, 2025; Bello *et al*., 2024). AI and blockchain together bring a way to automate, be transparent, and ensure data integrity to at least financial investigations (Rane *et al*., 2023). This review study explores the intersection between AI and blockchain and the way it can be used to improve financial due diligence, including automated risk assessment, anomaly detection, and secure access to past transactions. The aim will be to identify how integrated technologies can be used to minimize human error, enhance efficiency, and reinforce accountability in financial investigations to help establish stronger, more resilient, and trusted financial systems.

## BACKGROUND AND CONTEXT

### Evolution of AI & Blockchain in Financial Services

A bibliometric analysis shows an increasing momentum in research on AI-blockchain integration, with studies being centered on four





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major themes: finance and secure transactions, supply chain transparency, healthcare data management, and identification verification (Kumar *et al*., 2023). On a more concrete financial services level, there now appears to have been progress from theory to pilots to living applications (Vukovic *et al*., 2025). Artificial intelligence in finance has developed from rule-based to complex ensemble approaches, deep neural networks, and transformer models for processing multimodal data streams (Wu, 2024). Simultaneously, blockchains have advanced from their applications in cryptocurrency to private blockchains for regulatory requirements and protecting data privacy (Odeyemi *et al*., 2024).

**Rationale for Integration**

Integrating AI with Blockchain fills these gaps in each technology, which are inherent when each technology is employed individually. Though efficient in predictive analysis, AI algorithms lack some mechanisms to guarantee analysis integrity, such as model audibility (Kothandapani, 2025). On the other hand, Blockchain technology offers end-to-end audit trails with cryptographic validation; however, it doesn't have any in-built processing for predictive pattern analysis (Kulothungan, 2025). These architectures rely on AI for analysis processing, together with blockchain to track cryptographic assertions about AI conclusions, data provenance, and points for compliance (Kumar *et al*., 2023). Combined, these offer automated notifications with provable evidence of trials, in addition to smart contract compliance with efforts to meet technological and regulatory needs.

## THEORETICAL FRAMEWORK

### Artificial Intelligence Technologies in Financial Due Diligence

#### Machine Learning Fundamentals

Supervised, unsupervised, and reinforcement machine learning have evolved to become the foundation for intelligent finance systems, each paradigm lending its strengths to financial analysis. Gradient Boosting Machines (GBM), XGBoost, and random forest are now some of the most popular supervised learning models applied in financial classification, where they can result in high predictive accuracy and overfitting resistance (Venckauskas *et al*., 2024). In financial due diligence, the models improve automated risk assessment and anomaly detection through the efficient processing of complex data and uncovering hidden patterns, as well as mitigating the use of manual checks. They enhance the reliability of the investigation, reduce human error, and enhance more transparent and data-driven decisions in financial investigations and compliance oversight because of their strength.

Unsupervised machine learning algorithms, such as clustering and dimensionality reduction algorithms, facilitate the identification of unseen patterns and anomalies in uncategorized transaction data (Bello *et al*., 2024). Reinforcement machine learning can support financial due diligence by enabling improved decision-making through trial-and-error optimization, making the machine adaptive to risk and capable of identifying anomalies in evolving financial scenarios (Olanrewaju, 2025). Through historical and real-time data of the best strategies, reinforcement models minimize human interference, automate investigative processes, and enhance predictive probability in detecting fraud and monitoring compliance (Bello *et al*., 2024). Combined with blockchain, such systems will make sharing data safe and transparent, which will enhance efficiency and accountability in financial investigations (Shi & Wang, 2025). These algorithms are especially helpful in identifying new patterns in fraudulent transactions, which have not yet been recorded.

#### Deep Learning Architectures

It has been observed that deep neural networks have outpaced other networks by recognizing complex patterns in high-dimensional financial data that could be multimodal in nature. Conventional Neural Networks (CNNs), specifically those with convolutional layers, perform outstandingly on recognizing structured data patterns, while Recurrent Neural Networks (RNNs), along with Long Short-Term Memory (LSTM) networks, perform impressively on recognizing patterns in financial transactions (Wu, 2024). Recently, there have been breakthroughs incorporating transformer models with attention mechanisms for models to emphasize features in a long-term series of financial events selectively. It was observed in Wu (2024) that the BiLSTM-integrated transformer model achieved accuracy greater than 94% with an Area Under the Curve (AUC) greater than 0.95 in identifying financial risks within an enterprise, marking state-of-the-art performance in financial analysis based on multimodal data. Autoencoders, which belong to unsupervised deep learning algorithms, have proved efficient in anomaly detection in high-volume transactions. With their capability to detect





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patterns in compressed representations for normal transactions, autoencoders have been able to point out irregularities in transactions, which could be pointing to money laundering (Freire, 2024).

**Natural Language Processing and Large Language Models**

Natural language processing (NLP) tools have made it feasible to extract information from unstructured text data, such as financial statements, consumer communications, legal filings, and press reports. Conventional NLP applications like named entity recognition, sentiment analysis, topic analysis, etc., have received new improvements in the form of transformer models, such as Bidirectional Encoder Representations from Transformers (BERT), Generative Pre-trained Transformer (GPT), and financial language models (Mahendran *et al*., 2025).

It has been observed that Large Language Models (LLMs) possess amazing skill sets in comprehending financial jargon, identifying information from agreements, and, amazingly, enhancing smart contract rules based on natural language policy documents (Mahendran *et al*., 2025). It has now bridged the gap for compliance rules understandable by human language, which could not be executed by machines.

**Graph Neural Networks**

Graph Neural Networks **(**GNN) are the most appropriate tools in financial due diligence due to their ability to learn both entity features and relational structures. In this case, financial transactions are inherently graphical, where accounts are nodes, and transfers as edges, and, therefore, GNNs can capture the intricate interdependencies of many financial transactions. Spatial-temporal GNNs take this a step further by incorporating time dynamics, which allows auditors and investigators to identify changing trends in fraud, concealed anomalies, and coordinated suspicious transactions of several accounts (Walker and Alvarez, 2025). GNNs improve automated risk assessment, promote more effective and transparent, and reliable financial due diligence, and uncover hidden relational risks that are frequently overlooked by traditional models.

**Blockchain Fundamentals and Financial Applications**

Immutability, distributed consensus, and transparency are the key features of blockchain that enhance financial due diligence. Immutability helps to make audit trails tamper-evident and cryptographic techniques balance transparency and privacy as well as decentralize trust (Misal, 2024; Odeyemi *et al*., 2024; Albshaier *et al*., 2024). Public blockchains like Bitcoin and Ethereum are robust and have resistance of censorship, but have limitations to scalability and privacy, and permissioned blockchains like Hyperledger Fabric and R3 Corda provide controlled access, regulatory compatibility, and throughput that meet the requirements of financial organizations (Venckauskas *et al*., 2024; Wu, 2024). Smart contracts can be used to run due diligence in a more automated way, with predefined rules being executed and thus allowing better verification, multi-party contracts, regulatory reporting, and corrective measures, and newer extensions include large language model (LLM) logic (Davila *et al*., 2025; Yan *et al*., 2025). Lastly, consensus mechanisms including Practical Byzantine Fault Tolerance (PBFT) provide readable and secure, low-latency, and high-performance transaction validation, which guarantees a robust and efficient audit in enterprise financial settings (Wu, 2024).

**Integration of Frameworks and Architectures**

Combined models of AI and blockchain enhance financial due diligence. The Layered Architecture Pattern uses data, processing, orchestration, and interface layers to organize the processes involving blockchain's integrity assurance with the computational complexity of AI to provide automation in the workflow and analysis and guarantee the final security of the analysis (Kumar *et al*., 2023; Yuan *et al*., 2025). Hybrid On-Chain/Off-Chain Patterns implement a scheme of scalability to store mass data and AI-computed results off-chain and maintain the auditability of verifiable and confidential activity using cryptographic attestations such as hash commitments, Merkle trees, digital signatures, and zero-knowledge proofs (Odeyemi *et al*., 2024; Kumar, 2025). Federated Learning Integration allows the financial institutions to jointly train models without accessing raw data but facilitated through a blockchain to maintain privacy and enhance the assessment of fraud risks and to detect anomalies (Hasan, 2025; Odeyemi *et al*., 2024). Lastly, RegTech Integration incorporates governance and explainability and audit capabilities, such as XAI modules, model registries, provenance tracking, and privacy-preserving analytics, which allow regulators to have evidence of compliance which is transparent and auditable (El Khoury, 2025). These





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architectures in general complement transparency, accountability, and efficiency in financial investigations.

**AI Applications in Financial Due Diligence**

Regarding financial due diligence, AI applications include automated risk evaluation systems, which convert manual risk assessments into normalized, data-based scoring models aggregating varied data for real-time risk analysis (Wu, 2024). BiLSTM-based transformer hybrids, such as Wu's (2024) version, process multimodal data with an accuracy of more than 94% with an AUC value exceeding 0.95 (Wu,2024). Successful feature engineering, incorporating transaction, network, temporal, and behavioral variables, together with efficient, state-of-the-art techniques such as SHAP, improves model interpretability and accuracy (Venčkauskas *et al*., 2024; Jeyachandran *et al*., 2024). Real-time risk detection, taking about 10 seconds, combined with full-batch analysis for in-depth analysis via graph models or ensembled models, improves risk detection for overall financial due diligence (Wu, 2024; Venčkauskas *et al*., 2024; Jeyachandran *et al*., 2024). For anomaly detection tasks, autoencoders, isolation forests, and clustering algorithms can point out anomalies without requiring any labels for comparison, and autoencoders show better performance for complex anomaly detection (Patel, 2024). Semi-supervised and active learning strategies can also overcome the challenge of having few labels for comparison by making use of them for better performance. Additionally, the use of graph neural networks (GNN) can improve anomaly detection performance by modeling transaction graphs to detect activities like flash loan attacks and price manipulation (Davor, 2025). Predictive analytics takes fraud detection to new dimensions and provides future projections of risks and growing trends by employing machine learning models to monitor changes or drifts in concepts associated with account breaches before cashout or fraudulent activities happen (Jeyachandran *et al*., 2024; Bello *et al*., 2024). Benchmarking analysis depicts ensemble learning to deliver higher performance than others for blockchain-based money laundering detection tasks (See Table 1).

**Table 1**: (Venčkauskas *et al*., 2024)

| Model | Accuracy | Precision | Recall | F1-Score |
|---|---|---|---|---|
| XGBoost | 97.5% | 96.2% | 95.8% | 96.0% |
| Random Forest | 95.3% | 94.1% | 93.7% | 93.9% |
| Gradient Boosting | 96.1% | 95.0% | 94.5% | 94.7% |
| Deep Neural Network | 94.8% | 93.6% | 93.2% | 93.4% |
| Logistic Regression | 88.2% | 86.5% | 85.9% | 86.2% |

Resampling, cost-sensitive learning, or anomaly detection approaches deal with class imbalance successfully, thereby increasing detection levels while maintaining controlled levels of FP errors (Venčkauskas *et al*., 2024; Bello *et al*., 2024).

**Blockchain for Secure Data Sharing and Transaction Verification**

Distributed ledger technology (DLT) improves financial due diligence by creating tamper-proof shared records, thereby avoiding discrepancies in reconciliation, while settlement times are also shortened (Odeyemi *et al*., 2024; Abbas *et al*., 2025). Blockchain's immutability features guarantee verification for integrity, audit trails, and resolution for disputes, with reductions in dispute resolution times by 60% being recorded by (Wu, 2024).

Smart contracts enable automation of business workflows, enforce adherence, and enable easy response to regulations based on natural language processing for translation with Large Language Models (Abbas *et al*., 2025). Smart contracts are also able to initiate due diligence, approvals, and reporting, thereby, resulting in a 45% reduction in efforts. Oracle connectivity enables trusted access to any external data, thereby maintaining data integrity and preventing any attempted tampering (Odeyemi *et al*., 2024). Secure multi-party computation uses role-based management, zero-knowledge proofs, homomorphic encryptions, and confidential transactions to maintain privacy while being able to verify information (Patel, 2024). Blockchain-based shared KYC utilities facilitate faster onboarding of customers, enhanced data integrity, and adherence to Privacy by Design principles based on cryptographic access control mechanisms (Odeyemi *et al*., 2024). Regarding transactions, cryptographic techniques ensure authentication and integrity, whereas traces in the blockchain enable data lineage, model, and decision-making process tracing, thereby aiding in model verification, auditing, and forensic analysis





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(Venčkauskas *et al*., 2024; Wu, 2024; Igonor *et al*., 2025).

**Integrated AI-Blockchain Solutions for Financial Due Diligence**

Hybrid architectures couple AI processing with blockchain verification. They optimize their efficiency, privacy, and traceability for financial due diligence. Such architectures use layered designs, which include off-chain encrypted database storage, AI processing for risk assessment, use of blockchain with smart contracts, consensus, and their integration with oracle networks, APIs, as well as governance layers that provide regulatory traceability (Kumar *et al*., 2023; Wu, 2024; Abbas *et al*., 2025). Performance analyses reported scalability, having been able to process more than 80 transactions per second with a node configuration of 146 nodes with objective Byzantine Fault Tolerance (Wu, 2024). There is further complementary interaction between AI analytics, as well as use of blockchain security, that further augments financial due diligence with immutable recordings of AI analytics, thus further reinforcing due diligence traceability (Kulothungan, 2025; Odeyemi *et al*., 2024). Blockchain further permits federated fraud detection with preserved privacy (Li *et al*., 2025). Blockchain also permits smart contracts for enforcing AI risk assessment judgments, thus further optimizing due diligence with improved compliance, accountabilities, as well as efficiency with reduced latency with human errors (Abbas *et al*., 2025).

## COMPARISON WITH TRADITIONAL METHODS

**Manual Due Diligence Limitations**

This is because traditional processes have several limitations, for example, a lack of consistency because of subjective analysis performed by analysts, limited scalability since human analysis is not on par with the volume generated by many deals, while also being prone to latency, reviewer fatigue, and bias because analysis is conducted by humans whose judgments are influenced by cognitive distortions (Mazumder, 2025).

**Rule-Based System Limitations**

Static rule-based automated systems, belonging to the first generation, are improved in terms of consistency, yet they have problems like inflexibility, being unable to dynamically counter new patterns of fraud, high rates of false positives due to straightforward rules depending on thresholds, being vulnerable to clever fraud users attempting to evade overt rules, and increasing complexity in maintenance due to complex rule bases (Patel, 2024).

**Advantages of an Integrated System**

These limitations are overcome by AI-blockchain integrated systems, which provide adaptive learning, allowing models to learn from new data. Deep-learning-based identification enables the detection of complex patterns in money laundering. Secure automation is facilitated through audit trails in the blockchain, and enhanced collaborative intelligence is achieved through multi-party learning in these systems (Bello *et al*., 2024).

**Regulation Compliance and Governance**

Integrated AI and Blockchain platforms improve Know Your Customer (KYC) rules significantly in Anti-Money Laundering (AML), audit trails, and transaction history integrity by ensuring audit trail traceability, security, and integrity in data provenance among parties (Obasun, 2025). Blockchain's incorruptible ledger offers end-to-end visibility into due diligence process transactions, with AI's functionalities for automated verification, risk assessment, or anomalies, thereby minimizing inaccuracies in supervisory reviews (Odeyemi *et al*., 2024). AI-powered Blockchain-based platforms enable instant, auditable, and traceable reporting for improved risk management, faster reporting cycles, and simpler reporting for regulation-compliance purposes (Kulothungan, 2025).

Nevertheless, researchers emphasize the need for effective regulation to incorporate explainable AI (XAI) frameworks, making reasoning processes interpretable during automated risk analysis, thereby achieving accountability and auditability (Obasun, 2025). Governance processes compatible with protocols such as blockchain-based registries for models and access control through cryptography will also become crucial to preserve data integrity, privacy, and trust among organizations (Patel, 2024). Looking ahead, it is vital to integrate ethics into AI and have guidelines for internationally operable systems to keep AI blockchain regulation transparent and compliant with evolving environments.

## CASE STUDIES

**Case Study 1**: JPMorgan Chase - Successful Integration of AI-Blockchain Technology

JPMorgan Chase led the way to integrate AI and blockchain technology in its Liink network and its





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AI-based risk evaluation system. Liink is a platform developed on Quorum (a blockchain platform for enterprises based on Ethereum) to enable safe information exchange between 400+ institutions (Marappan & Narani, 2025). Using AI algorithms can automatically flag deviations or conduct real-time checks for suitability to facilitate transaction flow as per the business patterns of clients at actual transaction points. This combined approach resulted in as much as 70% reduction of delays associated with cross-border payments and inaccuracies associated with matching (John, 2025). Smart contract systems are used at Liink to permanently document any verification of transactions or obstacles to doing business, overcome by ensuring all act-related transactions are recorded for transparent audit reasons (John, 2025). At Liink, AI algorithms trained on combined data from several institutional settings also helped to flag any AML risks for transactions before final settlement (Marappan & Narani, 2025). The project revealed that combining the immutability of blockchain with the analytical capability of AI can give rise to a verifiable audit trail and scalable compliance infrastructure to achieve high operational efficiency and lower workloads on manual compliance audits throughout the JPMorgan global transaction ecosystem.

**Case Study 2: Wells Fargo -Failed Integration of AI-Blockchain Technology**

Wells Fargo's 2021 AI-blockchain for compliance project sought to apply AI analytics to automate customer due diligence and anti-money laundering (AML) monitoring with a hybrid model incorporating data provenance on a blockchain platform. Nonetheless, several challenges befell this project, including data governance concerns, conflicts regarding Privacy in legacy systems, and a lack of model interpretability. Blockchain technology proved to be infeasible with legacy data systems, thereby causing delays in operation due to multiple transaction records being generated, whereas regulators expressed their concerns regarding algorithmic interpretability, prompting them to put the project on hold. Lack of coordination between AI model interpretations and auditable blockchain records caused stakeholders to doubt the integrity of compliance. Lack of adoption from in-house, rule-based compliance professionals were also observed in this project, thereby emphasizing that AI, in conjunction with blockchain, in scenarios with inadequate model interpretability, insufficient governance, or unfeasible interactions with legacy systems for efficient data management, could generate fresh concerns instead of alleviating overall inefficiencies in operation (Oyegbade *et al*., 2021).

**Challenges and Limitations**

Integrated AI-blockchain solutions hold vast promise for financial due diligence. However, the solution faces many challenges. Technical problems relate to scalability in consensus algorithms, system compatibility within different financial systems, as well as system design that complements the deterministic processing of blockchain technology with the probabilistic nature of AI. Optimal Byzantine Fault Tolerance (BFT) algorithms, as well as hybrid models that use off-chain processing, show promise. However, issues related to oracle trust, immutability, explainability, remain severe (Kumar *et al*., 2023; Wu, 2024; Abbas *et al*., 2025; Mba *et al*., 2024).

Another barrier is regulatory compliance, which relates to a lack of clarity, conflicting laws, as well as transparency. Immutability within the GDPR remains a concern, mostly regarding the right of erasure, with off-chain solutions providing some solutions (Johnson, 2025; Jeyachandran *et al*., 2024; Al-Daoud & Abu-AlSondos, 2025; Patel, 2024). Privacy issues come with issues of transparency versus confidentiality. Zero-knowledge proof, homomorphic encryption, and federated learning provide solutions. However, additional problems come with processing speed (Odeyemi *et al*., 2024; Tahir & Tahir, 2024; Rong *et al*., 2025). Other barriers relate to a shortage of experts, organizational resistance, cost, as well as the threat of vendor lock-in risk. However, open-source solutions as well as standardization provide solutions (Kumar *et al*., 2022; Monferdini & Bottani, 2024; Abbas *et al*., 2025). It is important to solve these challenges so that transparency, accountability, and efficiency of financial due diligence can be improved.

**Emerging Trends**

New developments in AI-blockchain integration offer more capable financial due diligence. Fraud detection can be done with the use of a complex, dynamic financial network that is modeled with the use of a Spatial-Temporal Graph Neural Network (Trirat *et al*., 2024). Large Language Models are automated compliance tools that need reliability and verification studies (Abbas *et al*., 2025). Federated learning allows collaborative work, which is privacy-centric and comes with strong aggregation (Ahmad *et al*., 2025). Zero-





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knowledge machine learning guarantees integrity inspections in the outputs of AI, but computational performance is not as efficient (Patel, 2024).

**Research Gap**

Though there is an increasing global concern about the integration of AI with blockchain technology for financial due diligence, there is a major research gap in empirical studies for large-scale applications in real-life financial settings. Most researchers have concentrated on models, simulation studies, or proof-of-concept with respect to financial institutions. Other major gaps in financial due diligence in AI-blockchain technology deal with scalability for applications involving multiple transactions, multiple blockchains, or validation from financial regulations for AI-made financial due diligence conclusions. On the other hand, there have been few studies on socio-technical considerations like adoption resistance, human surveillance, or explanation for applications in financial due diligence. Though JPMorgan Chase's success with AI-blockchain technology in financial due diligence highlighted innovation, its failure in collaboration with Wells Fargo in financial due diligence showed financial transparency in financial due diligence applications to be decisive, not just innovation in finance. Some major gaps in financial due diligence with AI-blockchain technology have not *yet al*lowed researchers to propose common indicators for reliability in financial due diligence applications with innovation in AI-blockchain technology, or alignment between XAI's output for financial due diligence applications.

## DISCUSSION AND FINDINGS

There is great promise in the combination of AI technology and the use of blockchain technology that can significantly increase efficiency, transparency, and reliability (See Table 2).

**Table 2**: (Kuznetsov *et al*., 2024)

| Use Case | Blockchain Use | AI Use | Benefits |
|---|---|---|---|
| Health Care (Electronic Medical Records) | Secure record of patient health data | Process health data for insights and predictions | Enhanced data security, patient empowerment, improved health predictions |
| Supply Chain Management (Food Trust Project) | Traceability of food items from farm to store | Demand prediction, anomaly detection | Increased transparency, reduced waste, optimized supply chain |
| Financial Services (Numerai) | Secure and transparent marketplace for AI models | AI models for investment decisions | Democratized access to financial markets, improved investment decisions |
| Education (Sony Global Education) | Centralized management of educational data | Personalized learning plans, predicting learning outcomes | Integrity and security of educational data, personalized education |
| IoT (Xage Security) | Secure and tamperproof IoT security | Real-time threat detection and prevention | Secure and tamperproof IoT security, improved overall system security |
| Energy (Grid+) | Peer-to-peer energy transactions | Optimizing transactions based on usage data, market conditions | Reduced costs, improved efficiency, potential savings for consumer |
| Health Care (MedRec) | Decentralized management of medical records | Generate insights, predictive analytics for medical outcomes | Secure management of medical records, improved patient care |
| Agriculture (AgriDigital) | Transparency and traceability in grain supply chains | Predict market demand, detect fraudulent activities | Transparency and traceability, reduced fraud, optimized distribution |

Successful applications indicate that the use of permissioned blockchain infrastructure networks with AI analytics can minimize operational costs, speed up risk analysis, and increase the integrity of financial data within institutions. There are, however, difficulties. These include technology limitations with regard to scalability, interoperability, and merging the probabilistic nature of AI analytics with the deterministic nature of blockchain technology. Other difficulties relate to regulation, which will necessitate more defined rules, data structures, and explainable AI for accountability, transparency, and streamlined with existing regulations. Data privacy issues will necessitate the use of privacy-enhancing technologies, federated learning, as well as hybrid on/off chains techniques to equate confidentiality with auditability. Finally, difficulties in implementation, such as cost, a smaller number of qualified skilled personnel, and resistance within the organization, can be dealt with through employee training, open-source technology, as well as shared governance structures. Smart contracts also further increase efficiency regarding financial compliance with greater auditable and explainable AI output.

Furthermore, the scenario presented by JPMorgan shows that, through the application of permissioned blockchain platforms as well as the use of analytics powered by artificial intelligence,





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efficiency gains, minimizing operational friction, increasing risk assessment, and enhancing cross-institutional data integrity can be realized. On the other hand, the failure of Wells Fargo illustrates that poor interoperability, lack of explainability on the model, and poor change management can cancel out these advantages. Through the analysis, cryptographic assurance with AI adaptive intelligence will ensure the industry is successful in implementation, provided there is clear accountability, the data schema is standardized, and the data transparency is maintained according to the regulatory requirements.

Generally, the evidence supports the claim that AI-blockchain synergy is revolutionary and depends on addressing technical, regulatory, privacy, and operational issues. These limitations can be solved by innovation, governance, and ethical oversight so that integrated systems will provide stronger accountability, minimize human errors, and develop resilience in financial due diligence practices.

## CONCLUSION

The combination of AI and blockchain in financial due diligence has introduced a revolutionary way of accessing automation, accuracy, and regulatory certainty. Effective implementations, as in the case of JPMorgan Chase, show significant improvements in the accuracy of detecting fraud, efficiency of compliance, and audit transparency. On the other hand, failures like Wells Fargo depict that in the absence of effective data governance, explainable AI, and system interoperability, integration work will be run unstably and not accepted by regulating authorities. The paper finds that the technological potential must be supported by clear governance frameworks, regulative coordination, and the ethical adoption of AI. Future implementation ought to focus on authorized blockchains, explainable artificial intelligence, and unified structures for verifiable compliance records. These technologies, when well-coordinated, provide a paradigm shift in proactive, data-driven reporting of financial due diligence that reduces human error, enhances institutional accountability, and improves cross-border financial integrity.

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