



Towards the Enhancement of Banking Services Infrastructure through Blockchain Technologies: A Case Study of JPMorgan Bank

Ouafae MESSAH*

University of Mostaganem, Algeria

ouafae.messah@univ-mosta.dz

Sabrina AMROUCHE

University of Mostaganem, Algeria

sabrina.amrouche@univ-mosta.dz

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Abstract :

This study aims to investigate the role of blockchain technology in enhancing financial services by analyzing the experience of JPMorgan as a comprehensive digital banking model. The objective is to explore how this technology is adopted and leveraged to improve the infrastructure of the services provided, while drawing lessons from this experience to anticipate opportunities for integrating blockchain into the strategies of any banking system. The study concluded that J.P. Morgan Bank achieved a series of successes in utilizing blockchain technology, despite the technical and regulatory constraints and challenges encountered during its implementation. The bank sought to transform these challenges into opportunities for development and innovation, offering valuable lessons on how to effectively integrate blockchain within the banking environment. However, the replicability of this experience is not absolute; it depends on adapting the model to a supportive legal, regulatory, and human environment. Therefore, J.P. Morgan's experience serves as a strategic reference for inspiration, rather than a ready-made model for direct application without adaptation.

Key Words: Blockchain, Optimisation, Banking services, JP Morgan, Banking Sector

JEL Classification : G21, G29, O33, L86

*Corresponding author: Ouafae Messah (*ouafae.messah@univ-mosta.dz*)

Introduction :

In the last decade, the world has witnessed the birth of one of the greatest technological revolutions: the blockchain revolution. Initially, this technology gained prominence as an underlying infrastructure supporting the trading of crypto-assets, most notably Bitcoin. However, it quickly evolved into a technological hurricane sweeping across nearly every sector, opening limitless opportunities for innovation and efficiency. Blockchain has become a cornerstone of a new digital era founded on decentralization and absolute trust. Furthermore, several studies have indicated that the broader adoption of blockchain is expected, according to international estimates, to generate significant global economic gains. This has made it a matter of international interest and a necessary requirement for reshaping many vital sectors.



The banking sector is considered one of the most adaptable and most affected by this technological storm. Through banks, projects are financed, trade and investment exchanges are realized, and bridges of trust are built between savers and investors, thereby driving the wheels of the economy. Accordingly, the banking sector plays a pivotal role in the economy, and its adoption of the latest wave of digitalization, represented by blockchain technology, is expected to bring about a profound transformation—shifting it from the traditional framework to a digital framework capable of addressing the challenges faced by the sector. From this perspective, the adoption of this digital technology is not viewed as a mere option but rather as a necessity and a strategic transformation imposed by the new digital reality. This has driven banks to compete in exploring the boundless world of blockchain technology, among them the global giant JPMorgan, which has been selected as a successful model in embracing this innovation.

Problematic: Historically, banks have constituted the exclusive authority within the global financial system. However, the advent of blockchain technology has challenged and disrupted this dominance by altering traditional roles and reshaping the financial and banking sector through new contributions and innovative dimensions. In this context, the present study raises the following central research question: **How can blockchain technology contribute to enhancing and improving the infrastructure of financial services?**

This overarching inquiry gives rise to several sub-questions:

- Given that blockchain represents one of the most prominent outcomes of the technological revolution yet its concept remains ambiguous to many what are the essential concepts underlying this technology?
- What are the key applications of blockchain in the banking sector, and in what ways do these applications enhance the quality of services provided?
- To what extent has JPMorgan's adoption of blockchain technology contributed to the development of its banking services, and what insights can be drawn from the practical outcomes of this experience?

The importance of the study: The significance of this study stems from the necessity of responding to the digital transformation in which blockchain technology represents one of the most critical outcomes. It seeks to explore how this technology can be employed within the banking system to overcome the challenges facing the traditional infrastructure of financial institutions. To complement these perspectives, it is essential to review an exemplary global experience that illustrates the mechanisms and pathways of adoption, as well as the key lessons learned, which may serve as a basis for anticipating opportunities to integrate blockchain into the strategies of any banking system.

Research Methodology: The study adopted a **descriptive–analytical approach**. The **descriptive component** was employed to present academic literature related to blockchain technology, while the **analytical component** focused on assessing the applications of this technology and examining whether it contributes to enhancing banking services.

To achieve this, the researcher followed the following steps:



- **Case study method:** The study utilized the case study method, as it is suitable for conducting an in-depth investigation of a contemporary phenomenon. *J.P. Morgan Bank* was selected as it is one of the leading banks that have taken proactive steps in adopting this technology.
- **Data collection:** To ensure comprehensiveness and reliability, data were gathered from academic sources to build a solid theoretical framework. The case study data included official reports from the bank, documents published on its official website, and materials available through its specialized platforms.
- **Qualitative data analysis:** The collected qualitative data were systematically examined using **content analysis** to identify the achieved benefits, challenges, and obstacles encountered by the bank throughout its blockchain adoption journey.

The structure of the study: In order to fulfil the objectives of the study and in line with the question posed, we decided to divide the study into three main axes:

- The first axis: Theoretical foundation of blockchain technology.
- The second axis: Blockchain applications in the banking sector.
- The third axis: JP Morgan's experience in developing its services based on blockchain applications.

I. Theoretical foundation of blockchain technology

We try through this axis to provide an accurate theoretical foundation for blockchain technology (blockchain) due to the ambiguity surrounding this concept, as many hardly distinguish it from the most important digital currencies represented in Bitcoin, but it quickly exceeded this narrow framework and became an inevitable requirement for many sectors, and to remove this confusion and simplify these concepts, we will try to take note of the various important elements of this technology.

1 .The concept of blockchain :

Blockchain can be traced back to the emergence of the digital currency Bitcoin on 31 October 2008, when Satoshi Nakamoto published a paper in which he outlined a way to overcome the double spending scenario, an issue that plagued the cryptographic mechanism previously, but the first use of Bitcoin was on 03 January 2009, when Nakamoto created the first blockchain that combines a number of characteristics (the first block in the blockchain and the only one that has no previous block to link to, called the original block and issued himself the first 50 Bitcoins as all blocks in Bitcoin are due to this original transaction (ben mohamed & Toubal, i, 2020, p. 43).

- As for the definition of blockchain technology, or what is known in Arabic as blockchain, Merriam-Webster Dictionary defines it as an open ledger that can



efficiently record transactions between two parties in a verifiable manner. It further describes it as a digital database containing information such as records of financial transactions, payment dates, contracts stipulating commitments between anonymous parties, or data related to domain name ownership. It can be used simultaneously and shared across a large decentralized network that is accessible to the public (moustafa & hadouche, c, 2019, p. 132).

- Blockchain technology is defined as an interconnected series of blocks that record on its content a set of encrypted transactions, characterised by a high degree of security and transparency because it is managed through decentralised peer-to-peer networks, and it enables accurate tracking of information through a decentralised unchangeable record, and is based on the principle that information belongs to everyone and can be accessed (Gupta, 2022, pp. 1,2)
- Blockchain technology is also referred to as sequential databases, representing a type of decentralized ledger technology and a new generation of databases in which data is organized in a non-centralized manner. In this system, blocks of information are grouped together into units known as blocks, each containing sets of data. These blocks have specific storage capacities, and once a block is filled, it is linked to the previously filled block, thereby forming a continuous chain of data known as a blockchain. New information that follows the formation of a recently added block is collected into a new block, which is subsequently added to the chain once it is filled and this process continues like this (Bouzekri, 2018, p. 03).

2. Blockchain components: A blockchain is an integrated system with a number of closely related components:

2.1. Transactions: A transaction at the blockchain level is an interaction between different parties, as each block in the blockchain chain can contain a number of transactions. For example, a transaction in the case of cryptocurrencies is a transfer of that currency between users of the blockchain network, while in the case of institutions, a transaction is a way to record activities that occur on digital and physical assets, and the data constituting the transaction may vary, but the mechanism for conducting the transaction remains the same where the user sends a set of data regarding the sender's address, digital signature, public key, input, output, The inputs are usually a list of digital assets to be converted and the outputs are the calculations and value of the digital asset to be received by the recipient (Anish, Ashwiny selshiya, M, & shyla,l, 2021, pp. 41,42)

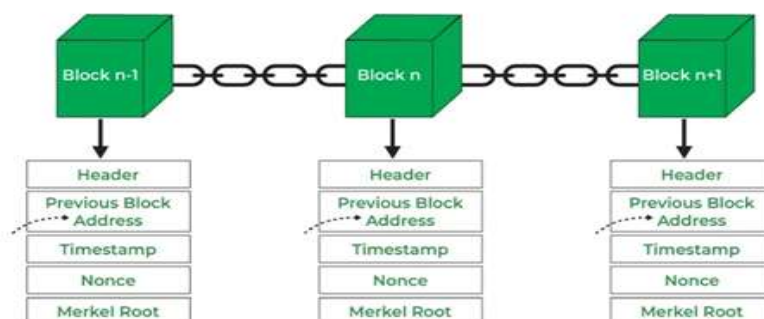
2.2. Hash codes: It is considered the DNA of each block, and it is one of the most important means that contribute to verifying the integrity of transactions, as for its shape, the hash code has a fixed length. This characteristic contributed to ensuring



that no party can penetrate the chain or modify the block data, in addition to the fact that no new blocks can be added until after solving the hash codes, and it should be noted that every time the hash function is applied to the same data within the block, the output must be the same, but if it is different, it means that the data has been modified (Meriem, 2023, p. 406).

2.3. The block: A block in blockchain technology is a unit of nodes with databases, containing a set of information, and blocks are linked to each other by loading the hash of the previous block on the current block, and the block structure can be visualised as consisting of two main parts, the block header and the list of transactions, where the block header contains a version number, the hash of the previous block, which is used as a reference that links the previous and current block, in addition to the time the block was created, the difficulty index that measures the complexity of creating the block, and the Merkle tree which is represented by a 32-byte long hash that is a hash of all transactions made within the block (Sunil kumar & Sumit, k, 2022)

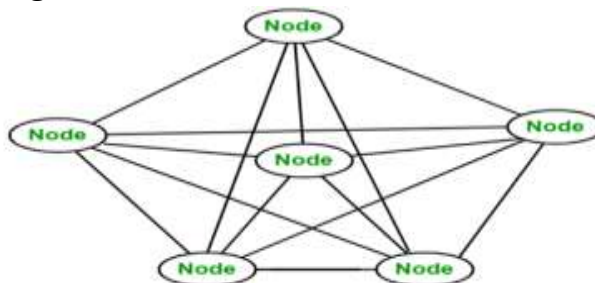
Figure 01: Structure of a Blockchain Block



Source: (blockchain structure, 2025)

2.4. Nodes: They are storage units that contain a large amount of data and these nodes may be computers, servers or laptops where they verify transactions and blocks, and if any change is made to the blockchain data, the nodes are able to detect it quickly (Meriem, 2023, p. 407), and the following figure shows this:

Figure 02: Nodes in the blockchain network



Source: (Introduction to Blockchain Technology, 2025)



2.5. Log (Ledger): It is a special register for recording transactions within the network and this register is shared by all users in the network, ensuring the transparency of operations (What is ledger in cryptocurrency?, 2025).

2.6. Nonce: A unique number for which a block cipher is determined to be authorised (ben mohamed & Toubal, i, 2020, p. 46).

3. Blockchain properties: These can be defined as follows (Wattana & danupol, h, 2018)

3.1. Centralisation and decentralisation: In traditional centralised database systems that rely on centralised servers where central intermediaries are relied upon to achieve the reliability and authenticity of transactions, unlike blockchain technology that operates in a decentralised environment where it operates in a peer-to-peer (p2p) environment and is considered a promising solution to the issues and costs of centralised transactions.

3.2. Continuity: Transactions recorded in the blockchain ledger are permanent and archived transactions that can be referred to at any time as each node maintains and controls its own records, and this characteristic results in the derivation of a number of qualities including transparency and immutability, which makes it resistant to any manipulation or fraud.

3.3. Transaction validity: Unlike some traditional systems where each node needs to execute every operation, blockchain system does not need to execute operations on each node, the transactions or blocks that are broadcast over the network are validated by different nodes by multiple participants such as signature verification or double-spending assurance, making it easy to detect any forgery or fraud.

3.4. Privacy: Privacy is the main characteristic of public blockchains, as the user's identity can be tokens that do not reflect the true identity of the user, and there is no need for any central authority to keep private information through the information of any transaction, so the true identity cannot be inferred, which maintains a certain amount of privacy, on the other hand, identity may be required in some authorised private blockchains.

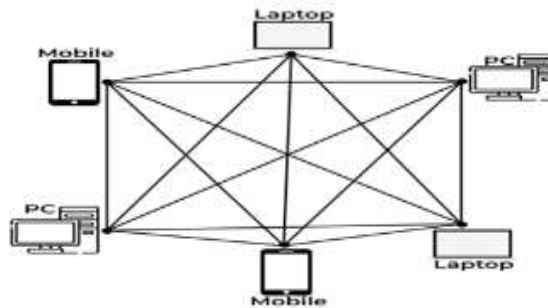
3.5. Auditability: The permanent information available allows for auditability and the degree of auditability varies across different blockchain systems and implementations. Private blockchain systems are less auditable due to centralisation and data not being available to everyone, unlike public systems which are more auditable because the nodes are fully centralised and the data is available to everyone.

4. Types of blockchains: There are 03 types of blockchains which can be mentioned as follows (blockchain structure, 2025):

4.1. Public blockchain: It is a fully decentralised system, as it allows everyone to see the data that is always available, and the data is secure as it cannot be modified after it is verified and approved, and since operations are not managed by one party, there is no need to obtain permission to access the public blockchain, as anyone can set up their node or create a block within the network, after the node or block settles

within the blockchain, all blocks communicate with each other in a peer-to-peer manner.

Figure 03: Public blockchain



Source: (blockchain structure, 2025)

4.2. Private blockchain: A private blockchain is different from a public blockchain in that it is managed by the owner of the network, and a trusted person is responsible for operating this type of blockchain, controlling who can access it, as well as determining access to the private chain network. There may be some restrictions when trying to access the private blockchain network, depending on the policies of the organisation running it.

4.3. Hybrid blockchain: A type that combines the characteristics of public and private blockchains, with the aim of achieving a combination of the advantages offered by both types, this system allows controlling access to data on the one hand, while maintaining a certain amount of transparency on the other, making it suitable for applications that require a balance between privacy and openness.

5. How blockchain works: Blockchain technology works as a direct and immediate accounting system that saves all information related to financial transactions or contracts and is disclosed to the parties involved in the blockchain technology, which can be summarised in the following stages (How does the blockchain work?, 2025):

5.1. Transactions: The user creates a new transaction and then all the information to be transferred is encrypted by the private key related to the user's digital signature, and then verifies the validity of the signature using the public key.

5.2. Transaction Validation: The transaction is sent to a network of distributed peer-to-peer (p2p) computers where the nodes validate the transaction in terms of having enough balance in the sender's wallet to execute the transaction, or validate the digital signature using the sender's public key.

5.3. Forming a new block: Once a transaction has been validated and authorised as a legitimate transaction, it is added to what is known as a mempool, where a combination of them creates a new block.

5.4. Consensus algorithm: Each node is not allowed to add blocks to the network randomly, so it relies on the consensus algorithm, which ensures that each new block added is the only copy of the real one and generates the hash for that block, which is necessary to add it to the chain.

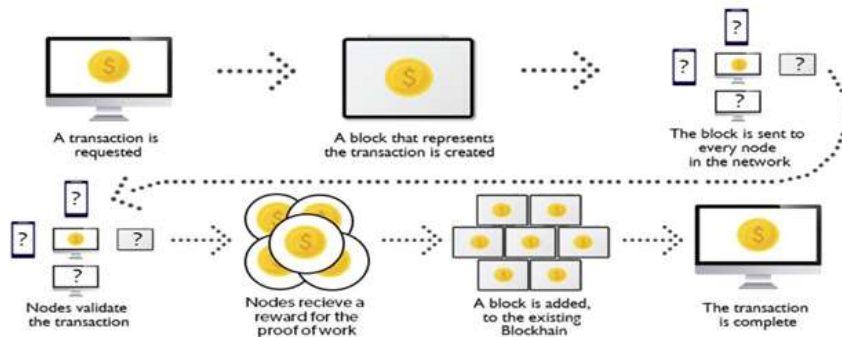
5.5. Adding a new block to the chain: After a new block gets its own hash, it is ready to be added, as each block contains the hash of the previous block and thus the



blocks are cryptographically linked together to form the chain, and the new block is added to the open end of the chain, i.e. at the end of the blockchain.

5.6. The transaction is finished: Once a block is added to the blockchain, the transaction is considered complete, and the details of this transaction are permanently stored on-chain.

Figure 05: Blockchain Mechanism



Source: (How does the blockchain work?, 2025)

II. The second theme: Blockchain Applications in the Banking Sector

Blockchain is one of the revolutionary technologies that have transformed the way banking services are delivered, by providing innovative solutions that address traditional issues in the sector, which has had a tangible impact on increasing the efficiency of the sector.

1. The most important fundamental differences at the level of the banking business that adopts blockchain technology: We will try to summarise the content of this element in a table that explains the stages of the evolution of the banking business through its transition from traditional to digital and then to blockchain-integrated business, while trying to identify the most important contributions made by the integration of this digital technology at the level of the banking business environment:

Table 01: Comparative Table of Banking Evolution

Traditional Banking	Digital Banking	Blockchain-based Banking
Standardized traditional activities	Innovative activities	Innovative activities
General banking services	Standardized banking services	Standardized banking services
Low customer experience	Improved customer experience	Improved customer experience
Multiple intermediaries	Multiple intermediaries	No intermediaries – peer-to-peer
Complex clearing process	Complex clearing process	Distributed ledger: transfer = clearing
Low efficiency	Low efficiency	High efficiency
High manual oversight	Low manual oversight	Fully automated process
High operational costs	High operational costs	Low operational costs
Centrally stored and temporary data	Centrally stored and temporary data	Decentralized, cloud-based, and permanent data
Easy access to customer information	Easy access to customer information	Encrypted and fully secured customer information
Weak protection	Weak protection	Very high-level protection

Source: (Liang, 2016, p. 06)



By analysing the most important points, we find that the traditional banking environment suffers from many problems, but blockchain technology, with its characteristics such as the absence of intermediaries and decentralisation, has created radical solutions that are more secure and transparent compared to traditional systems, while maintaining data privacy, making it an inevitable technology.

2. Blockchain adoption model in the banking sector: In this element, we will try to propose a model for how to adopt blockchain technology in banks, based on a study presented in this field entitled:

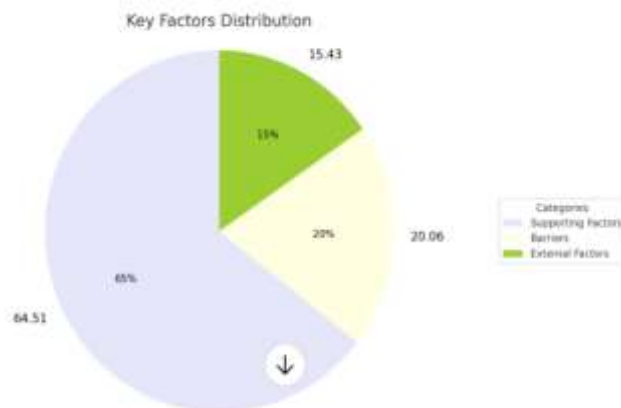
"Blockchain Adoption Model for the Global Banking Industry (Zaina, Evans akwasi, gyasi, & Deneise, dadd, 2020, pp. 133,139), where the study relied on qualitative data represented in laws and official reports issued by legislators and practitioners in the banking sector at the global level, as inputs to the study. Additional data related to current adoption models and blockchain technology and its uses were collected through a review of scientific literature represented in books, academic journals and official websites, and the study relied on the content analysis technique, which is an analytical methodology that works to transform qualitative data into quantitative data, and relied on tools such as online Voyant and NVivo.

The study also talked about a number of factors that would support blockchain adoption in the banking sector. As quantitative data, the most influential factor in blockchain adoption was found to be improving customer recognition (46.80%), followed by improving the speed of transactions and then the smart contracts factor that would automate transactions, which would reduce human errors and costs. The study found that the secondary and less focused factors that are considered as drivers of blockchain adoption are regulatory compliance, improved data exploration and increased transparency, which were considered secondary benefits rather than primary drivers, After talking about motivations, the study listed a number of barriers that limit the promotion of blockchain adoption on a large scale, represented by governance as the main barrier with 32.43%, which confirms the urgent need for clear regulation and an integrated governance framework, followed by legislation and regulations, infrastructure challenges, scalability issues, accessibility, and the last barrier represented by energy consumption with 5.80%.

The researcher also considered situational factors that are influenced by the surrounding circumstances without being supportive or hindering, which he identified as three elements of security, cost and interoperability (the ability to integrate with existing systems). The security factor came first with a rate of 71.20%, and then another factor was added that was found to have an impact represented in competitive advantage with a rate of 10.55%, which was considered as a supportive factor for the adoption of this technology, The factors are ranked at the following rates: supportive factors at 64.51%, hindering factors at 20.06%, and situational factors at 15.43%. This confirms that the factors supporting adoption outweigh the rest of the factors, which confirms that blockchain is an inevitable digital future, not an optional one.



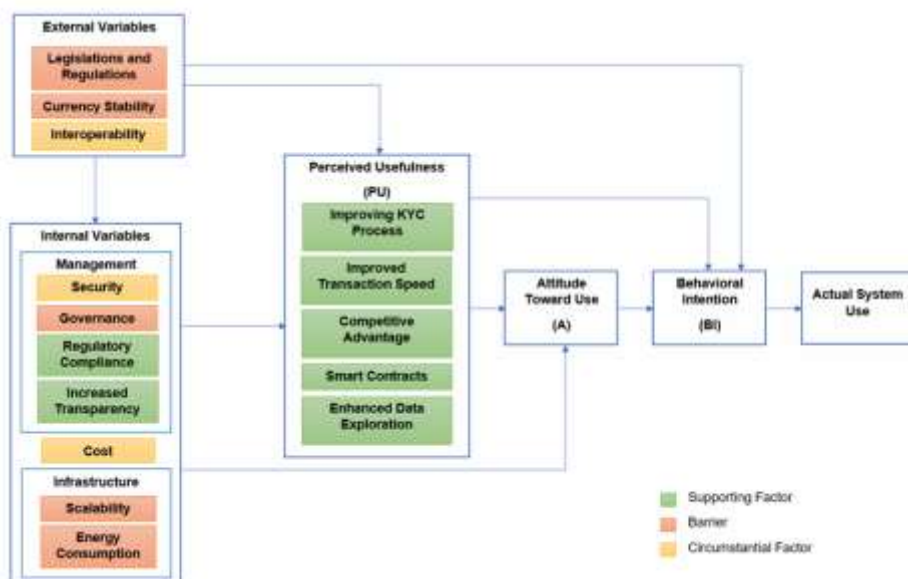
Figure 06: Distribution of factors influencing blockchain adoption in the banking sector



Source: Prepared by the researcher based on (Zaina, Evans akwasi, gyasi, & Deneise, dadd, 2020, p. 139)

The study also presented a model for blockchain adoption in the banking sector as follows:

Figure 07: Blockchain Adoption Model in the Banking Sector



Source: (Zaina, Evans akwasi, gyasi, & Deneise, dadd, 2020, p. 142)

The analytical model presents a framework for understanding the factors influencing the adoption of blockchain technology, by categorising them into three main categories: Supporting Factors, Barriers, and Situational Factors. These are categorised into external variables, such as legislation, currency stability, and interoperability, as well as internal variables that include governance (e.g. security, governance, and regulatory compliance), cost, and infrastructure (e.g. scalability and energy consumption), Together, these factors contribute to the perceived benefit of blockchain technology, which is reflected, for example, by improving the Know



Your Customer (KYC) process, among others. This benefit, in turn, influences the user's attitude towards use, which determines the behavioural intention to use, all the way through to the actual use of the system.

3. Blockchain applications in the banking sector: Today, blockchain technology is used in the banking sector in several areas, the most prominent applications of which include the following (al-dmour & al, 2024, pp. 02,03):

3.1. Cryptocurrencies and payments: Blockchain technology is known to be the basis for many cryptocurrencies such as Bitcoin, allowing for secure cross-border payments and making transactions as quickly, accurately and securely as possible.

3.2. Smart contracts for process automation: These contracts ensure transparency and accuracy in transactions, and the integration of AI with blockchain-based smart contracts improves operational efficiency and performance, thereby enhancing security in the financial sector.

3.3. Identity verification and Know Your Customer (KYC): Blockchain enhances identity verification and KYC processes By ensuring data accuracy, confidentiality and integrity, blockchain improves customer relationship management (CRM), which enhances security, privacy and transparency.

3.4. Trade finance and supply chain management: Blockchain technology plays an important role in trade finance by providing a transparent platform for tracking transactions within the supply chain, reducing costs and errors in paperless e-commerce, improving inefficiencies in the supply chain and product movement, and supporting quality control.

3.5. Cross-border payments and remittances: The decentralised nature of blockchain is a key factor in facilitating cross-border payments and remittances, saving time and cost. Commercial banks are leveraging blockchain to provide instant funding solutions, improving working capital management and interbank transactions, and the technology enables electronic money transfers via mobile devices without the need for physical transfer locations, reducing transaction fees.

3.6. Fraud prevention and cybersecurity: This technology enhances fraud prevention and cybersecurity efforts, ensuring the security of sensitive data associated with personal investments, interbank transactions and customer loyalty programmes.

3.7. Record-keeping and auditing: A transparent and immutable blockchain ledger is a powerful record-keeping and auditing system. It supports customer relationship management by providing a secure repository of customer information.

3.8. Loyalty programmes: A decentralised blockchain platform improves the efficiency of loyalty programmes by securely managing rewards points. This contributes to customer relationship management through a tamper-proof system to document interactions with customers.



III. JP Morgan's experience in developing its services based on blockchain applications

We will try to discuss the most important blockchain applications implemented at the bank level and showcase how they contribute to the optimisation of the banking infrastructure:

1. About JPMorgan Chase: JPMorgan Chase is a global banking and financial services holding company headquartered in New York City. It is the largest bank in the United States and ranks among the top ten in the world. The company has more than 40 operating subsidiaries employing more than 250,000 people in 60 countries around the world. Its subsidiaries serve four major markets:

- Consumer and Community Banking.
- Commercial Banking.
- Investment Banking.
- Asset Management (Jp morgan the ultimate guide to jp morgan. , 2023).

2. The Bank's interest in FinTech innovation: The bank pays wide attention to innovation in financial technology, and one of its most prominent trends is investing in blockchain technologies, which reflects its interest and commitment to adopting digital solutions to upgrade the infrastructure of financial services, which would enhance its competitive position in the banking industry. Through the presentation of SWOT analysis, we find that the bank's most prominent strengths are its leading technological capabilities, as the bank has invested in technological innovation and this has enhanced customer experiences through digital banking services that ensure transparency with profit in time and cost.

Figure 08: SWOT analysis of JPMorgan Chase Bank



Source: (pereira, 2023).



3. The most important historical milestones of blockchain adoption in the bank:

We will review the most important milestones in the Bank's adoption of this technological revolution by summarising them in the following table:

Table 02: The historical evolution of blockchain adoption by JPMorgan Chase

Stage	Events
Exploration (2015-2016)	2015: Establishment of a dedicated team to explore blockchain adoption. 2016: Development of Quorum, a private blockchain network.
Expansion 2019-2020	2019: JPM Coin is launched as a digital currency used to settle payments. 2020: The bank sells the Quorum platform to Consensys and launches a new unit called Onyx.
2022	The launch of Defi's cross-border transaction is in collaboration with DBS Singapore as a public blockchain.
October 2023	onyx launches a new TCN application to transfer digital collateral between institutions such as Barclays and Blackrock, transforming transaction times from days to minutes.
2024	Renaming Onyx to Kinexys as a step to enhance blockchain services. Developing a blockchain network in space using smart contracts capable of autonomous transactions in space.

Source: Prepared by the researcher based on: (ConsenSys Acquires Quorum Platform from J.P. Morgan, 2020), (JPMorgan moves to commercialise blockchain with Tokenized Collateral Network, 2023), (Introducing Kinexys by J.P. Morgan, 2024), (Space Bridge: Pioneering Payments in Space, 2025).

4. The most important blockchain applications in the bank:

JPMorgan Chase is at the forefront of integrating blockchain technology into the traditional financial sector, as the bank's motives are not limited to achieving direct gains but reflect a smart and inevitable response to market requirements and the challenges of the digital age, so we must take note of the most important blockchain platforms adopted by the bank:

4.1. Quorum (later discontinued): It is a private blockchain platform that is a modified version of Ethereum, an open-source project that allows any developer to contribute to it, among the most important features of this platform:

a- Transaction privacy: This allows transactions to be completed while maintaining confidentiality without being available to all participants in the network.

b- Restricted access: Access to the network or sharing requires authorisation.

c- Faster transaction speeds: It achieves higher transaction processing capacity than public Ethereum, with many use cases reporting speeds of up to 200 transactions per second (How JP morgan is transforming banking with blockchain & JPM coin, 2023)

4.2. The onyx platform: As of 2024, the platform has been renamed as kinexys, and the change of this name has played an important role in transforming the role of the platform from a mere service provider to a digital financial hub for banks and institutions, in addition to the fact that the name combines **Connectivity + Nexus** to signify a globally connected financial network, and that this transition reflects the



transition from experimental innovation to operational infrastructure, meaning that the beginning was technical to move to the operational phase, which includes:

a- JPM Coin: This digital currency operates on a network whose access is limited to those who are authorised to do so, this provides a high level of security with the possibility of settling transactions immediately unlike traditional banking procedures that may take days or even weeks. and it also carries out these transactions around the clock without relying on the working hours of traditional banks and a real-life example is Axis Bank in India, which provides an immediate dollar payment service in cooperation with JP Morgan through this platform, and its most prominent characteristics are (How JP morgan is transforming banking with blockchain & JPM coin, 2023):

- Are not purchasable: They cannot be purchased by the public or individuals and are only used for business-to-business (B2B) transactions.
- Intended for institutional payments.
- Convertible: JPM Coin can easily convert into other tokens or digital assets within the blockchain network, providing high flexibility in closed digital environments.

b- digital assets: This platform is one of J.P. Morgan's flagship initiatives aimed at empowering financial institutions through the power of tokenization. It enables the conversion of assets into digital formats using programmable tokens, Among its key benefits are:

- Increase liquidity: Especially for illiquid assets such as treasuries.
- Accelerate and securitise daily repo transactions: This is done using digital collateral, eliminating the need for costly options.

Fast and Flexible Borrowing: Smart contracts allow borrowing large amounts of money for short periods of time, simplifying procedures and reducing operational costs (Hamed, 2024)

c- liink: is a system and network that enables the exchange of data between banks, restructuring the way money, information and assets move around the world, originally launched as a pilot project in 2017, More than 400 financial institutions have signed up to become liink participants including 27 of the world's 50 largest banks representing 78 countries, and to cater to customers' needs, two new apps, confirm and format, have been launched:

c1. Confirm: Allows verification of account information before payment is initiated, to minimise operational costs associated with payment instruction errors and potentially reduce fraud.

C2- Format: Allows verification of payment instructions to check whether the payment message accurately conforms to the basic requirements of the country and currency (eyidilli, 2020).

d- (Tokenised Collateral Network - TCN): A new interbank collateral settlement application that, in May 2022, underwent internal testing and proved its potential by enabling BlackRock to easily convert shares from one of its money market funds



into digital tokens, After that, the tokens were transferred to Barclays Bank as collateral for an over-the-counter derivatives transaction. This marked a revolution in the collateral settlement process and a significant step toward the digitization of collateral operations (The Tokenized collateral Network: A breakthrough in collateral settlement, 2023).

e-Blockchain Launch: It allows banks to develop and commercialise their innovative applications based on blockchain technology, fostering a collaborative environment within the financial sector, driving co-innovation and wider adoption of the technology.

f- Space Blockchain Network: JPMorgan has pushed the boundaries of innovation by creating the first-ever blockchain network in space, a secure and decentralised network that operates between satellites orbiting the Earth, this pioneering initiative leverages the power of both blockchain technology and the Internet of Things (IoT) to achieve its ambitious goals:

f1-Interruption-resistant transactions: The network facilitates seamless payment processing from Earth to space, even in the event of a loss of connection to Earth stations, ensuring that financial operations continue for organisations operating in space.

f2-Self-transactions in space: The network enables secure and efficient transactions within space itself, eliminating the need for constant communication with Earth (Hamed, 2024).

5. The role of blockchain technology in upgrading the bank's banking infrastructure: Blockchain technology has played a crucial role in upgrading the Bank's banking infrastructure by transforming the level of services from traditional to smart digital, enabling the Bank to overcome many traditional challenges, which is reflected in the expansion of the use of these platforms among major financial institutions, In this element, we will try to identify the reality of the practice of this technology by presenting some quantitative data related to the Kinexys platform and then turning to show the benefits that result from the application of this technological wealth.

5.1. The reality of practising this technology in the bank: We will try to present some data that shows the experimental start of this technology up to the operational phase within the limits of the data we were able to obtain:

a. Evolution of the number of transactions made with JPMcoin: The evolution of the volume of transactions made with jpmcoin has had a number of key milestones:

2020-2021: The pilot phase, where transactions were internal and between a small number of customers, and there was an estimated value of the volume of payments in the range of 10-50 billion \$ per year.

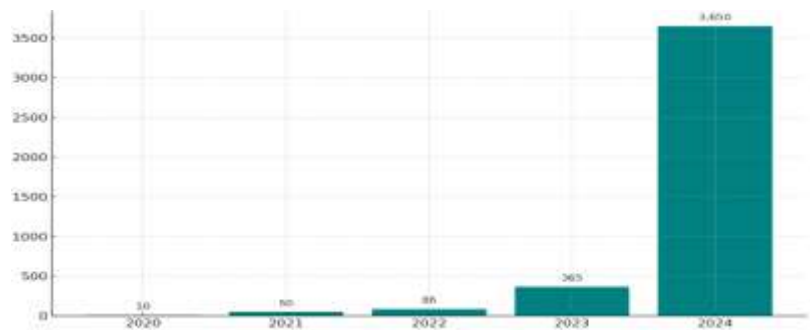
2022: This is the start of the growth phase, where the volume of payments was estimated at 86bn\$ per year.



2023: This is the tipping point in terms of rising acceptance, with an estimated 365bn\$ in payments volume.

2024: A huge leap forward with payments expected to reach 3.65 trillion\$, confirming that this growth reflects jpmcoin's transition from an internal pilot project to a major digital payments platform.

Figure 09: Evolution of the number of jpmcoin transactions at JPMorgan through 2024 (\$1bn).



Source: Prepared by the researcher based on (khatri, 2023), (investing, 2023), (Jagtiani, 2023)

b. General information about the Kinexys platform as the core blockchain arm of the bank: The platform is the main blockchain arm of the bank, and despite the scarcity of published data, the growth of transactions and the expansion of its reach are strong evidence that the platform has a human base (experts) and an advanced technical base that makes it fulfil its requirements, and the most important data available can be summarised in the following table:

Table 03: Important data about the blockchain in the Kinexys platform

Key Insights about Blockchain on the Kinexys Platform	
Experts and Technologists	The platform includes a growing number of specialized experts and technologists. It features a dedicated division called Kinexys Labs, an internal research and development unit responsible for exploring and advancing blockchain solutions. The team focuses on implementing advanced technologies in areas such as digital identity, tokenization, and multi-chain integration, aiming to support a robust digital enterprise environment.
Transaction Volume Growth	The platform currently processes an average of over 2 billion \$ in daily transactions. Since its launch, Kinexys has processed more than 1.5 trillion \$. It has recorded a 10-fold annual growth in payment-related transactions.
User Expansion and Partnerships	The platform has gained widespread recognition in the Middle East, with 8 banks in the region now operating on it. Notably, in March 2025, Qatar National Bank utilized Kinexys Digital Payments services for US dollar blockchain-based transfers. in February 2025, Saudi National Bank adopted the same platform to enhance real-time treasury operations.

Source: Prepared by the researcher based on: (chase, How Kinexys by J.P. Morgan can make commercial real estate more efficient, 2024), (Morgan Rebrands Blockchain Payment Platform as 'Kinexys, 2024), (chase, Kinexys by J.P. Morgan flourishes in the MENA region, 2025).



5.2. The benefits of implementing blockchain in the bank: To demonstrate the added value and positive impact that blockchain adoption has had on the bank, we will draw a comparison between the traditional challenges faced by the bank and the innovative solutions provided by blockchain applications:

Table 04: Benefits of implementing blockchain in a bank

Application	Traditional Challenge	Benefit
Jpm coin	cross-border payment settlement (3-5 working days with high costs)	Instant settlement (7/24) Reduce costs by 80% Settle in 5 seconds instead of 3 days.
TCN	Collateral Settlement Longevity	Settle collateral in minutes. Processing more than 500 billion guarantees since 2022. Optimise capital efficiency. Reduce settlement time from 5 days to 15 minutes.
Liink	Errors in payment instructions and lack of pre-verification	Reduce identity verification time from weeks to hours by verifying account information and checking message formatting by country and currency, minimising errors. Network expands to more than 450 financial institutions. 40 per cent reduction in authentication costs.
Digital assets	Outdated settlement systems with too many risks and delays	90 per cent of reconciliation processes are automated with fewer manual errors.
Blockchain launch	Legacy systems	Support a specialised enterprise development environment that accelerates the design and launch of targeted blockchain applications.

Source: Prepared by the researcher based on: (morgan, 2023, 2024), (liink, 2025), (JPMorgan chasing the future with tokenised settlements,, 2023), (Develop next-generation blockchain solutions for your business, 2025).

5.3. Challenges of Blockchain Implementation in the Bank:

Despite the remarkable success achieved by J.P. Morgan in integrating blockchain technology into its banking operations, its journey has not been without a series of obstacles and challenges accompanying this profound technological transformation. The bank faced technical, regulatory, and organizational difficulties that affected the pace of implementation and the extent to which the experience could be generalized across its various branches and activities, Therefore, through this section, we will present a brief overview of the general challenges facing the implementation of blockchain technology in the banking sector, and then proceed to analyze and diagnose these challenges at the level of J.P. Morgan Bank: (Nashida & djnouhat fadila, 2025)

a. Regulatory Challenges: The absence of a clear legal and regulatory framework is one of the main obstacles to adopting blockchain technology in banking systems. The lack of international and national legislation governing the use of this technology raises issues related to jurisdiction, compliance, and integration with



traditional systems. Moreover, the decentralized nature of blockchain increases the difficulty of monitoring transactions and limits the role of monetary authorities.

b. Security and Privacy Challenges: Although blockchain is generally more secure than traditional systems, data protection and privacy issues remain a major concern—especially given the transparency and traceability of transactions. Furthermore, the potential misuse of the technology for activities such as money laundering or tax evasion raises significant regulatory concerns.

c. Lack of Trust and Understanding: The limited awareness and technical knowledge of blockchain technology represent a major obstacle to its widespread adoption. The ambiguity surrounding its functioning and real benefits continues to undermine the confidence of institutions and users in embracing this technology.

d. High Cost and Low Efficiency: Operating blockchain systems requires significant computational power and storage capacity, leading to high operational and maintenance costs. Moreover, the efficiency of the system is directly linked to the number of users and network speed, making it essential to evaluate the cost-benefit ratio before fully implementing the technology in the banking sector.

When analysing the bank's experience, it becomes evident that one of the main challenges it faced was the abandonment of the Quorum platform, which the bank had developed internally in 2016. Due to its limited scalability and the high cost of technical maintenance, the bank ultimately decided to sell the platform to ConsenSys in 2020. This decision represents a critical turning point in the experience, revealing the practical limitations of blockchain implementation within large financial institutions. It also highlights the importance of adapting to market requirements rather than insisting on closed, internally developed solutions.

Moreover, the bank faced governance and regulatory challenges, particularly regarding the exchange of sensitive data across decentralized networks, as well as legal compliance issues with international banking standards such as Basel III and FATF. These challenges slowed down the widespread adoption of the technology across the bank's various operations.

In addition, despite the significant growth in JPM Coin transaction volumes, the currency remains closed and limited to business-to-business transactions. This highlights the ongoing regulatory challenge faced by stablecoins and central bank digital currencies within a global regulatory environment that often lacks clarity. While growth data from the Liink network indicates broad institutional adoption, achieving a full "network effect" across the global financial industry still requires time and effort. This points to the challenge of scalability and interoperability among different blockchain networks, which remains a well-known barrier to broader blockchain adoption. In conclusion, it can be said that despite the challenges, success can still be achieved, as the success of innovation does not lie in the absence of obstacles, but rather in the institution's ability to analyze, invest, and develop a more efficient and sustainable business model.

**Conclusion:**

The study concludes that blockchain technology is no longer just a technical option but a strategic necessity dictated by the nature of the digital transformation that the financial world is witnessing, as reflected in the main findings:

- Blockchain is a digital system for storing and exchanging data, based on a distributed and secure architecture that allows participants to record information in a transparent, permanent and immutable manner without the need for a centralised intermediary.
- Blockchain technology is used in the banking sector for a number of applications that have transformed the way banking services are delivered.
- Blockchain technology, with its disintermediation and decentralisation, has created radical solutions that are more secure and transparent than traditional banking systems.
- The blockchain adoption model in the banking sector presents a framework for understanding the factors influencing the adoption of this technology, by classifying them into 03 categories of supportive factors, barriers, and situational factors that collectively contribute to shaping the expected benefit of the blockchain, which affects the user's attitude towards the use, which determines the behavioural intention and the actual use of the system.
- JP Morgan's experience is exemplary because of the bank's focus on innovation and investment in financial technology, reflecting its commitment to adopting digital solutions to optimise the financial services infrastructure.
- The bank is at the forefront of integrating blockchain technology into the financial sector and is responding to the inevitable in a digital age by adopting a range of platforms and applications.
- The results of the implementation of these platforms reflected a number of positive effects such as reducing operational costs, enhancing security and transparency, reducing manual errors, providing smart and instant payment solutions, enhancing competitive advantage and other benefits.
- In conclusion, the researcher believes that the reason for the bank's success in adopting this technology is due to the establishment of a specialised blockchain unit within the bank, such as Kinexys, which seeks to develop innovative applications and coordinate the integration of systems.

Lessons Learned from JPMorgan Bank's Experience in Adopting Blockchain Technology:

- Learning from failures: The failure of the Quorum platform was not a setback but rather a fundamental step that enabled the bank to develop more mature platforms.



- Aligning technology with governance: Implementing blockchain in a legally regulated banking institution requires careful alignment between technological innovation and regulatory controls such as data protection.
- Technological partnerships and alliances as a prerequisite for scalability and sustainable success: The bank realized that building an integrated blockchain ecosystem goes beyond the boundaries of a single institution; therefore, it relied on strategic partnerships with companies such as ConsenSys and Microsoft.
- Investing in human capital: The bank invested in training its employees to manage digital assets and understand distributed ledger systems. Hence, successful digital transformation requires qualified human capital capable of adapting to modern technologies.
- Strategic transformation of the business model: JPMorgan leveraged blockchain not merely as a technological tool but as part of a comprehensive strategic transformation of its business model aimed at enhancing transparency, accelerating settlements, and expanding cross-border services.

Assessment of the Replicability of the Experience: Despite the pioneering nature and relative success of JPMorgan's blockchain experience, its replicability is not absolute; rather, it depends on several conditions:

- **Technical and financial infrastructure:** Replicating the experience requires robust technical and financial infrastructure, such as large-scale communication networks and distributed servers resources that may not be readily available in banking institutions in developing countries.
- **Legal and regulatory framework:** JPMorgan's success was supported by a flexible legal environment in the United States that allowed experimentation with distributed ledger technologies. In more restrictive banking systems, implementation would require prior legislative adaptation.
- **Institutional size and digital maturity:** Full replication is feasible only for large or multi-branch banks with advanced digital capabilities. Smaller institutions may instead adopt simplified or hybrid versions of the model.
- **Organizational culture and readiness for change:** The success of JPMorgan's experience was tied to an institutional culture that supports innovation and is willing to accept technological and managerial risks. Therefore, without a genuine culture of change and belief in innovation, replication will face significant obstacles even if other conditions are met.

In conclusion, while replication of the experience is possible, it must be adapted to local contexts in terms of legislation, technological capacity, and human resources. The JPMorgan case thus serves as a strategic reference for designing future digital transformation policies in banking, rather than as a ready-made model for direct application—it is inspirational, not replicable in a literal sense.



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