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Payments Ecosystem Transformation: Evolution, Challenges and Opportunities

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Introduction

"Money is an intermediary; it is a measure by which things are compared and equalized in value".

A paraphrase of Aristotle´s ideas in Ethics to Nicomacheus, Book V.

The provision of payment services is a fundamental pillar for the exchange of monetary flows within the financial system. This activity is undergoing continuous transformation, driven by a highly competitive environment. In this context, all participants in the ecosystem – understood as the actors, infrastructures, standards and technologies that facilitate the transfer of economic value between end users, both in retail and wholesale payments – are impacted to varying degrees by the changes resulting from this transformation. This includes central banks, financial institutions, non-bank service providers, technology operators, and users[1].

The payments ecosystem: An evolution tied to the advancement of civilization and driven by innovation

The history of the payments ecosystem reflects the economic and social progress of humankind. From the most rudimentary forms of barter to automated digital systems, this area has accompanied the development of civilization. In the 21st century, it has become one of the most dynamic areas within the financial and technological sphere, catalyzing new forms of economic exchange.

Various international organizations, such as the Bank for International Settlements (BIS), have highlighted this transformation in their reports, pointing out both the opportunities and the associated risks. According to the BIS, the new paradigm calls for the development of an efficient, secure and interoperable payments infrastructure that contributes to monetary stability and financial inclusion.

The COVID-19 pandemic accelerated this evolution, driving the adoption of contactless payment methods, the growth of e-commerce and the intensive use of digital financial services. This acceleration has marked a transition from a traditional banking-centric model to a more diverse, decentralized and collaborative ecosystem, comprised of an interconnected network of institutions, technology companies, regulators, infrastructure providers and end users.

Today's payments ecosystem: an attractive and growing ecosystem

Today's payments ecosystem is characterized by the coexistence of multiple players and technologies. These include the use of cash, traditional card schemes (such as Visa or Mastercard), bank transfer systems, digital wallets, mobile payments using QR codes, as well as a growing number of innovative solutions, such as payment platforms integrated into social networks or marketplaces.

This diversity of players and technologies makes the payments ecosystem a dynamic, attractive and constantly expanding environment, with four key areas of evolution according to data from the International Monetary Fund[2]:

- **Changes in deposit and lending patterns:** While the number of bank accounts has increased globally, many regions have seen a decline in the value of deposits and loans. For example, in the Middle East and Central Asia, the ratio of loans to GDP fell from 59% in 2021 to 55% in 2022. This decline can be attributed, in part, to the reversal of policies implemented during the COVID-19 pandemic to encourage lending, as well as a tightening of monetary policy in response to rising inflation.

- **Transformation in the means of access to financing:** In recent years, there has been a significant shift in financial access channels. While traditional access points, such as ATMs and bank branches, are in decline, non-traditional platforms, such as retail agents and mobile money operators, are experiencing remarkable growth.

- **Sustained growth in digital financial services:** In most regions, digital financial services continue to expand in terms of both volume and number of transactions, consolidating their position as a key trend in the global financial system (see figure 1).

[1] BIS (Bank of International Settlements) Committee on Payments and Market Infrastructures - Fast payments – Enhancing the speed and availability of retail payments (https://www.bis.org/cpmi/publ/d154.pdf).
[2] Financial Access Survey and International Monetary Fund staff calculations. (https://www.imf.org/en/News/Articles/2023/10/03/pr23332-imf-releases-the-2023-financial-access-survey-results?).

- **Increased use of digital financial services:** The proliferation of digital channels has inevitably led to an increase in their use, evidenced by the growing number and volume of digital financial transactions. For example, in Africa - a region that is a mobile money powerhouse - the value of these transactions rose from 26% to 35% of GDP between 2021 and 2022. In Europe and the Western Hemisphere, there has been a shift in preference toward mobile and online banking, with the volume of digital banking transactions per 1,000 adults growing by over 20 % in 2022.

Challenges of an expanding ecosystem

The exponential growth of the payments ecosystem raises fundamental questions around its security, governance, resilience and accessibility. One of the main challenges is to maintain user trust in a landscape where cyber-attacks, identity theft and digital fraud are on the rise, and where reliance on external dependencies – such as power, internet connectivity, mobile communications networks, data center infrastructure, DNS and digital certificate services – is fundamental for a fully digital environment.

Likewise, the irruption of new technologies, such as artificial intelligence and blockchain technology, has given rise to disruptive payment models, for which regulatory frameworks are still evolving.

Among the most transformative innovations has been the emergence of cryptocurrencies. Originally conceived as decentralized alternatives to fiat money, cryptocurrencies such as Bitcoin and Ethereum have evolved into digital assets. Although they are not yet widely used as an everyday means of payment, their impact on the global financial architecture has been significant.

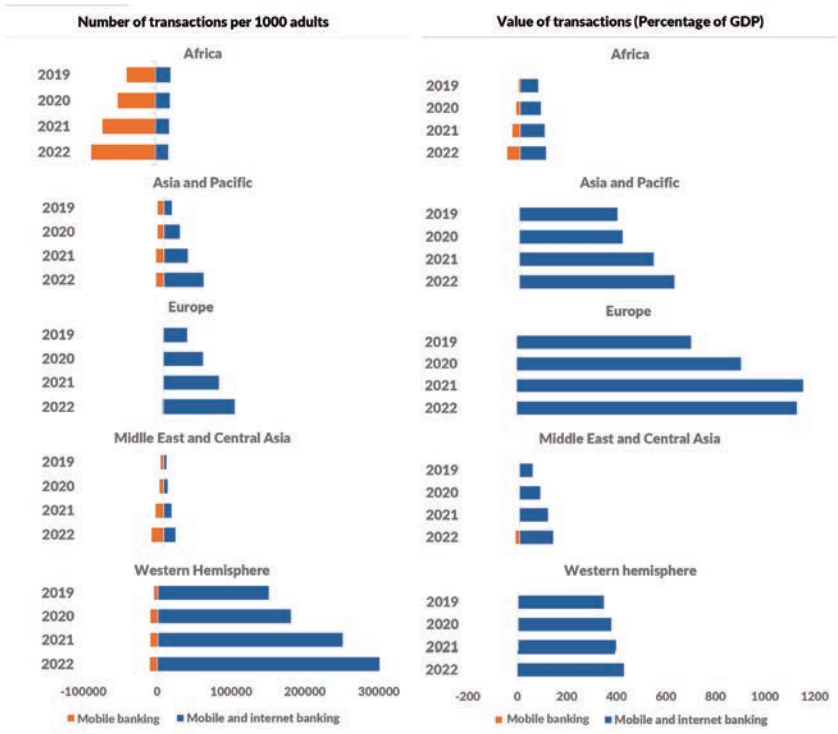
In response to this phenomenon, numerous central banks are exploring the development of Central Bank Digital Currencies (CBDCs) as a regulated alternative to private cryptocurrencies. The Atlantic Council's CBDC Tracker[3] provides a detailed and up-to-date visualization of countries that are researching, developing or implementing such digital currencies. According to the most recent data, 134 countries - collectively accounting for 98% of the global GDP - are considering launching a CBDC. In May 2020, that number was only 35 countries (see figure 2).

On the other hand, financial inclusion[4] remains a pending goal in many regions of the world. Digital, economic and cultural divides continue to exclude millions of people from the formal payments system, limiting their full participation in the global economy.

[3] https://www.atlanticcouncil.org/cbdctracker.

[4] Financial inclusion is a central global development goal and a key component of the United Nations 2030 Agenda, particularly for Sustainable Development. It is explicitly addressed in Sustainable Development Goal (SDG) 8: Decent work and economic growth, specifically relating to target number 10, which aims to "Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all" - United Nations (https://www.un.org/sustainabledevelopment/es/economic-growth).

Figure 1. Evolution of transaction volume and value per transaction by region from 2019 to 2022.



Source: Financial Access Survey and IMF staff calculations.

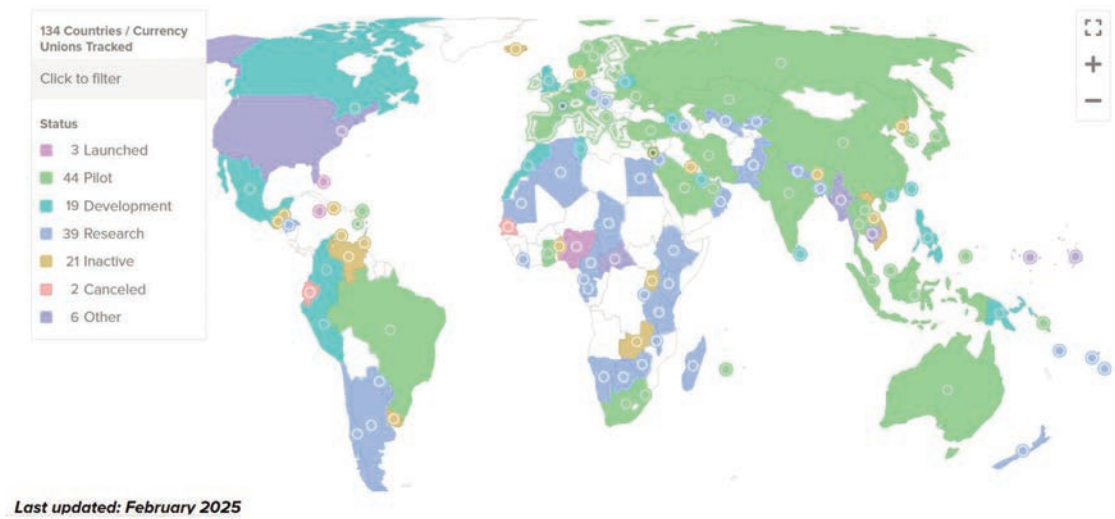
Finally, regulation and oversight of the payments ecosystem faces the challenge of adapting to an unprecedented pace of innovation without slowing down its development. The balance between fostering competition and protecting the consumer is becoming increasingly complex in an environment where the boundaries between technology and finance are becoming increasingly blurred.

How to help understand the nature of the changes?

The complexity of the payments ecosystem makes it difficult to fully understand the scale and nature of its underlying dynamics. This document aims to clarify these dynamics through a structured informative approach:

- A historical overview of the evolution of the payments ecosystem, highlighting the key drivers of transformation that have compelled both payment service providers and users to adapt in order to stay ahead in the provision and use of such services.
- A description of the current ecosystem, addressing both the market perspective (supply and demand of payment services) and the regulatory framework that governs it.
- An analysis of the transformation challenges faced by the various players in the ecosystem, considering the growing level of digitalization and technological sophistication of companies and individuals – factors that have rendered many traditional payment solutions obsolete.
- A reflection on the opportunities arising from such profound transformation, both for traditional players – those who have historically led the ecosystem – and for new entrants, whose nature, scale or technological capabilities position them to become relevant players in the ecosystem.

Figure 2: Status of CBDC issuance around the world.



Source: Atlantic Council CBCD tracker.

Executive overview

"Behind every great business lies a secret that outsiders don't know".

A paraphrase of the ideas of Peter Thiel (co-founder of PayPal) in Zero to One

Evolution

1. In its broadest meaning, the concept of payments - like that of trade - dates back to the Neolithic period, where it was initially practiced as an exchange of products of equivalent value, in what is commonly known as the "barter era"[5]. This term was not coined by a specific figure or monetary authority but is a conceptual expression used in economic history and financial education to describe the period before the invention of money, when economic exchanges were carried out through the bartering of goods and services.

2. The introduction of the first coins in Lydia (a region in which is now western Turkey) in the mid-7th century B.C.[6], marked a revolution in the history of payments and gave rise to the so-called "era of metal". This era is characterized by the integration, in a single payment instrument, of the three fundamental functions of money: a unit of account, a medium of exchange and a store of value[7]. As in the previous case, the term "metal era " is not attributed to a specific author but is used in economic history to describe the era when precious metals – such as gold, silver and copper – were first used as commodity money and later as coined money.

3. The later introduction of paper money in 7th-century China - during the Tang dynasty, although its use was consolidated under the Song dynasty in the 11th century[8]- marked the beginning of fiat money. In this phase, the value of currency was based on social trust rather than intrinsic value, giving rise to the "paper era". This term, used conceptually and pedagogically, describes the historical period when paper money became the dominant medium of exchange. From the 17th and 18th centuries onwards, the growth of commercial banking and the institutional strengthening of banks helped to standardize the use of paper money. It was in this context that payment services, as we understand them today, first emerged[9].

4. In the mid-20th century, the invention and widespread adoption of the first payment cards[10] gave rise to the so-called "plastic era", another significant transformation in the payments ecosystem. This new medium allowed merchants to directly access funds available in customers' accounts, without the need for checks, cash or bank transfers, while keeping control of the payment process within financial institutions. The term "plastic era" does not have a specific origin either; it isa conceptual term that gradually emerged to describe the widespread use of plastic materials in everyday life, particularly in the financial industry, with the proliferation of credit, debit and prepaid cards as payment instruments.

5. The emergence of the Internet at the end of the 20th century introduced a new disruptive element in the evolution of payments: the rise of electronic commerce (e-commerce). Traditional means of payment soon proved inadequate for the dynamics of the digital environment, leading to the involvement of technology companies – initially outside the financial sector – that offered more agile payment solutions better suited to the new context. This gave rise to what is known as the "accounts era"[11], a phase characterized by the coexistence of traditional means of payment with new digital services offered by third parties, where traditional financial institutions are forced to compete with players from other economic sectors.

6. At present, various experts and monetary authorities agree that we are transitioning into a new phase whose name is not yet fully consolidated. Among the terms proposed are "decoupled era", " digital money era", " interoperable ecosystem era" or "era of programmable accounts and payments"[12]. This phase is characterized by the fact that it goes beyond the simple holding of a bank or digital account, focusing on automation, interoperability, digital intelligence and decentralization of financial services. In this new context, the very concept of currency is being redefined with the emergence of private cryptocurrencies and digital currencies issued by central banks (Central Bank Digital Currencies, CBDCs)[13].

[5] European Central Bank, What is money?, 2015 https://www.ecb.europa.eu/ecb-and-you/explainers/tell-me-more/html/what_is_money.en.html.

[6] Glyn Davies (1919 - 2003: Professor of Economics at the University of Wales and economic advisor to the British government), A History of Money: From Ancient Times to the Present Day -2002.

[7] European Central Bank, What is money?", 2015 https://www.ecb.europa.eu/ecb-and-you/explainers/tell-me-more/html/what_is_money.en.html.

[8] Niall Ferguson (1968 -): Professor at Harvard University, Stanford University and London School of Economics), The Ascent of Money: A Financial History of the World, 2008.

[9] European Central Bank, The role of banks (https://www.ecb.europa.eu).

[10] "In 1950 the first credit card appeared in the United States, issued by Diners Club. It was intended to facilitate payments in restaurants without the need for cash" - Banco de España, Blog del Cliente Bancario - Historia de los medios de pago (https://clientebancario.bde.es/pcb/es/blog/Historia_medios_pago.html). (https://clientebancario.bde.es/pcb/es/blog/Historia_medios_pago.html).

[11] "Having an account is the first step to financial inclusion. The current era is one of accounts: digital, mobile or bank accounts, enabling payments, savings and access to credit." - World Bank. Global Findex Database 2021(https://globalfindex.worldbank.org).

[12] "We are transitioning to an ecosystem where money is not only digital, but also programmable, interoperable and smart. This is a new paradigm in the architecture of money." - BIS, Blueprint for the future monetary system, 2022 https://www.bis.org/publ/arpdf/ar2022e.pdf.

[13] "The digital euro, one of the main CBDCs envisaged, would be a digital currency of the European Central Bank, an electronic equivalent of cash and would complement banknotes and coins, giving citizens an additional choice on how to pay" - European Central Bank - Digital Euro: Frequently Asked Questions (https://www.ecb.europa.eu/paym/digital_euro/html/index.en.html).

The decoupled era

7. The "decoupled era" is characterized by a shift from cash and cards as central elements to a model based on universal, instant and interoperable access to digital payments. This access is made through open accounts and open technologies, with financial inclusion as one of its main strategic objectives.

8. This new digital paradigm in the payments industry manifests itself on both the demand and supply sides:

   - On the demand side, the consumer is an increasingly sophisticated and digital agent, demanding payment solutions aligned with their consumption habits:

     - Digital payments: In the last decade, advances in electronic banking and the development of mobile applications have significantly contributed to the digitalization of financial services, facilitating the transition from physical means (cash, checks, cards) to digital payments, understood as those executed through the Internet or initiated from electronic devices.

     - Immediate payments: In an e-commerce environment with 24/7 availability, immediacy has become a key requirement. Digitalization is no longer enough: users demand instant, secure and always accessible payment services.

     - Integrated or invisible payments: Today's consumers increasingly prefer shopping experiences where payment is seamlessly integrated into the process. This preference has driven the adoption of solutions such as mobile payments and in-app systems.

     - Payments with low access friction: The perception that bank onboarding processes are complex has generated a growing demand for payment solutions that do not necessarily require a traditional bank account, driving the emergence of alternative services and more accessible financial products.

     At the same time, it continues to consider cash as an asset contingent on the external dependencies that a fully digital payments ecosystem would have, among which the following could be highlighted:

     - Electric power supply.

     - Internet connectivity.

     - Mobile communications networks.

     - Data center infrastructure.

     - DNS services and digital certificates.

   - On the supply side, the market is constantly expanding:

     - In terms of service providers: Alongside traditional players (financial institutions, card issuers and acquirers, payment gateways), new entrants such as fintechs, bigtechs and large technology corporations have emerged, attracted both by the sector's growth potential and by the strategic value of the data generated.

     - In terms of types of services: Traditional methods now coexist with new payment solutions, such as Account to Account (A2A) transactions, payments via QR codes, mobile devices, or via digital currencies, both public and private.

9. The evolution of the payments ecosystem in recent decades has contributed to its perception as a highly attractive sector, based on several key factors:

   - Sustained growth of the digital payments market: The rise of e-commerce, the digitalization of financial services and innovation in mobile banking have catalyzed the shift from physical methods to digital solutions.

   - Strategic value of data: The decoupling of payments from cash has transformed payments into a crucial source of data, coinciding with the development of technological capabilities for the large-scale exploitation of this data.

   - Reduction of intermediaries: The current ecosystem offers opportunities for disintermediation, allowing some companies to vertically integrate their payment and collection processes, thereby reducing costs per transaction.

   - Leveraging economies of scale: The growing volume of operations benefits those players capable of operating on a large scale, providing them with significant competitive advantages.

10. At the same time, the very concept of currency has evolved. Until just over a decade ago, money was primarily represented by coins and banknotes, which had three essential attributes:

    - Physical support (metal or paper).

    - Issuance and recognition by central banks, granting it legitimacy as a means of payment.

    - Fungibility, i.e. the possibility of being exchanged without loss of value.

This paradigm was radically altered on October 31, 2008 with the publication of the white paper "Bitcoin: A Peer-to-Peer Electronic Cash System"[14], a document that laid the foundations for using blockchain as the underlying technology for cryptocurrencies.

Cryptocurrencies have reached a significant degree of maturity. Their legalization in countries such as El Salvador, the initiatives in the United States to establish a federal reserve based on cryptoassets, or the upcoming regulation in Europe through the MiCA (Markets in Crypto-Assets) framework[15], expected to be deployed by 2025, are proof of this. This regulation will allow financial institutions to offer services linked to cryptoassets, favoring their mass adoption.

The operation of cryptocurrencies introduces a new paradigm in the field of payments, with technical and operational characteristics different from those of traditional currencies. In this context, three key concepts emerge as particularly relevant:

- Custody: The loss of the private keys associated with the cryptocurrency position implies the irreversible loss of the asset, making secure management of these keys critical.
- Wallet: Users operate through digital wallets, from where they sign and execute transactions.
- Decentralization: There is no intermediary financial entity; transactions are carried out directly between peers (peer-to-peer) or between users and merchants, without centralized banking supervision.

11. This transformation of the payments ecosystem has been accompanied by an equally dynamic regulatory process. Over the past decade, Open Finance has emerged as a new regulatory paradigm focused on financial data, with core principles that include:
    - Data liberalization: Financial and non-financial entities can access data with the client's explicit authorization.
    - Protection and control: A security framework, typically established through standardized APIs, allows the customer to control what data is shared and for what purpose.

    Although the scope of Open Finance extends beyond the payments sector, the first regulatory frameworks were implemented within this area, most notably the European Union's PSD2 Directive (Second Payment Services Directive). Since this pioneering regulation, the model has expanded globally (as of December 2024, 60 jurisdictions had already approved Open Finance regulatory frameworks, with another 10 having frameworks under development).

12. While priorities vary by region – such as financial inclusion in Latin America and Asia, or regulatory sovereignty in Europe, the United States and China - common elements that shape today's payments ecosystem can be identified.:
    - Centrality of digitalization and instant payments.
    - Growing prominence of digital accounts, electronic wallets and mobile solutions.
    - Promoting the interoperability of financial services.
    - Active focus on the development and evaluation of public digital currencies (CBDCs).

[14] https://bitcoin.org/bitcoin.pdf
[15] https://www.cnmv.es/portal/mica/regulacion-criptoactivos?lang=es

Challenges

13. As discussed, the payments ecosystem is undergoing a profound transformation, driven by digitalization, technological advancements and shifting consumer behaviors. This transformation presents considerable challenges for both financial and non-financial entities. In this context, it is crucial for organizations to understand the nature of these changes and adapt their strategies to remain competitive.

14. Technological development, exemplified by the well-known Moore's Law - which predicts exponential growth in processing capacity with minimal increases in costs[16] - can be considered the main driving force and, at the same time, the greatest challenge in advancing this new era in the payments industry. This progress has opened up significant opportunities for both traditional and emerging players, attracting technology companies capable of innovating in short cycles to the sector. Technologies such as Near Field Communication (NFC[17]), QR codes, tokenization and biometric systems have radically transformed payment services, improving their security and usability. However, this technological sophistication requires heavy up-front investments, with profitability potentially delayed over time.

15. Along with the challenge of extensive technology use, the pace of change in the payments industry is dizzying: innovative solutions are quickly becoming market standards. This requires organizations to cultivate a solid culture of agile change, enabling them to realign their capabilities with emerging trends and adopt more efficient solutions.

16. In payments, scale is a critical, though not exclusive, factor in achieving financial success. While the ability to handle large transaction volumes is essential, fee revenues are steadily declining and, in many models, do not guarantee the profitability needed to sustain technology investments. The real advantage of scale lies in its ability to enable complementary and more profitable services. A large customer base and high transaction volume provide institutions access to valuable transactional data, which can be used to offer products such as credit, insurance, investments and personalized financial services.

17. The proliferation of new payment methods and business models also brings about emerging risks associated with new forms of financial crime. It is crucial to continuously update risk detection and mitigation strategies, with financial fraud and money laundering being the most significant threats in the payment sector. In this regard, it is worth highlighting the potential of quantum computing[18] in fraud prevention (both for its ability to detect anomalous patterns, which can contribute to the analysis of transactions and the detection of possible fraud with greater precision, and to improve the security of financial transactions to prevent cyber-attacks).

Opportunities

18. Although the evolution of the payments ecosystem could be interpreted as a threat to the traditional, historically dominant players, this transformation also offers significant opportunities, particularly for those willing to embark on deep digital transformation journeys. Some of these opportunities include:

    - Access to new customer segments, either by filling gaps in traditional channels (especially with corporate customers) or by reaching underserved segments, such as SMEs, using tools such as marketplaces that allow centralizing payment demands waiting to be covered by a banking entity.

    - Expansion and innovation in product and service offerings, with examples such as:

        - Solutions related to cryptocurrencies.

        - Services under the Banking as a Service (BaaS) model.

        - Creation of innovation hubs.

        - Implementation of Decentralized Identity (DID) services.

[16] Moore's Law: An empirical observation made in 1965 by Gordon E. Moore, co-founder of Intel, on the progress of semiconductor technology (https://newsroom.intel.com/es/nuevas-tecnologias/intel-newsroom-archivo-2022).

[17] (NFC) Near Field Communication (NFC) is a short-range wireless communication technology that enables data exchange between compatible devices within a few centimeters (typically up to 4 cm), using radio frequency magnetic induction in the 13.56 MHz band. - Klaus Finkenzeller - RFID Handbook: Fundamentals and Applications in Contactless Smart Cards, Radio Frequency Identification and Near-Field Communication (2010).

[18] Quantum computing is an emerging field of computer science that takes advantage of the principles of quantum mechanics to perform computations in a radically different way than classical computing (Central Bank ofUruguay: (https://www.bcu.gub.uy/NOVA-BCU/SiteAssets/Disrupci%C3%B3n%20de%20la%20computaci%C3%B3n%20cu%C3%A1ntica%20en%20el%20sistema%20financiero%20y%20de%20pagos.pdf).

- Data monetization: Digitalization has generated large volumes of transactional data, which can be integrated with an entity's pre-existing data to create new revenue streams and improve the customer experience in the face of emerging competition.

- Collaboration with niche companies can act as an innovation accelerator through strategic alliances. These companies offer specialized solutions that allow banks to adopt advanced technologies and significantly improve the user experience - without incurring the costs of internal development[19].

- Proprietary digital currency issuance capability, as in the case of Kinexys Digital Payments (formerly JPM Coin), an authorized blockchain-based system, which functions as a real-time, 24/7 payment rail and deposit ledger between J. P. Morgan clients.[20].

19. In an expanding ecosystem, where commissions to intermediaries account for a significant portion of transaction costs, many non-traditional players have opted to integrate payment services into their offerings, competing directly with financial institutions as payment service providers.

20. However, entering the market as a direct payment service provider is not the only avenue for new entrants. Other opportunities include:

    - Leveraging Open Banking solutions by integrating with bank accounts to offer specialized services:

        - Account aggregation
        - Payment initiation
        - Scoring/debt advice model development
        - Overdraft coverage

    - Payment services in Web 3.0 through NFTs: Within virtual environments such as the metaverse, payments are made through digital wallets that allow transactions with non-fungible tokens (NFTs[21]).

    - Decentralized Finance (DeFi) based solutions: financial applications built on blockchain that operate without intermediaries, using smart contracts to automatically execute agreed terms[22].

    - Banking as a Platform Model: Leveraging payment data to scale the offering to other financial services, emulating the digital platform model dominant in other sectors, such as transportation, e-commerce or tourist accommodation.

Conclusion

21. While the complete disappearance of cash, which remains a contingent asset, is not anticipated, the trend towards its decline in favor of digital means of payment is clear and persistent.

22. This transition implies a profound transformation in the provisioning of payment services, redefining the way we pay and get paid. This structural change affects all members of the payments ecosystem in a cross-cutting way.

23. Adapting to this environment implies that all players must evolve towards digital models. In the coming years, we foresee an ecosystem where:

    - The intensive use of technologies will continue to grow, with a special focus on offering more agile, secure and personalized experiences.

    - New players will continue to join, intensifying competition and innovation.

24. The opportunities that arise in this scenario are significant, both for traditional players in the financial system - who have the potential, for example, to access new customer segments and innovate their product and service offerings - and for new participants, who can explore business alternatives through direct competition with financial institutions as payment service providers, or through the development of complementary services (such as open banking solutions, payment services through NFTs or decentralized finance solutions, for example).

25. In this context, only those participants capable of agile evolution towards digital models, with a global and integrated vision of their processes and technological architectures, and with robust control systems, will be able to lead the payment services industry, generate value for their customers, and consolidate themselves as relevant players in the new ecosystem.

[19] Banco de España – *Taxonomy of the Spanish FinTech ecosystem and the drivers of FinTechs' performance.* (https://repositorio.bde.es/bitstream/123456789/13545/1/Taxonomy_Fintech.pdf).

[20] J.P. Morgan – Kynexys Digital Payments (https://developer.payments.jpmorgan.com/docs/treasury/globalpayments/capabilities/global-payments-2/jpm-coin-system/index).

[21] European Banking Authority (EBA): "An NFT is a unique cryptographic token representing an asset, digital or physical, not exchangeable for another of equal value. It can confer rights over an underlying asset, but its legal nature depends on the specific use, the type of asset linked and the applicable regulatory framework." (https://www.eba.europa.eu).

[22] Harvard Business Review, "DeFi and the Future of Finance" (2021) (https://store.hbr.org/product/decentralized-finance/UV9021?sku=UV9021-PDF-ENG).

The payments ecosystem: where do we start?

"The story of payments is the story of how trust becomes technology".

A paraphrase of the ideas of Neha Narula, Director of the Digital Currency Initiative at the MIT Media Lab..

The origin of the payments ecosystem can be traced back to the emergence of trade in its most primitive form, when human beings began to exchange surplus agricultural production for necessary goods or services. It was in this context that the concept of payment was born, understood as the consideration associated with a transaction or exchange between two parties.

Since then, the payments ecosystem has undergone a progressive evolution, adapting and becoming more sophisticated to meet the changing needs of its participants. It encompasses a complex web of actors, infrastructures, regulations and technologies that facilitate the transfer of economic value between end users. This system includes both retail and wholesale payments, involving central banks, commercial banks, non-bank payment service providers, infrastructure operators and end users, as defined by the Bank for International Settlements (BIS[23]).

To understand the starting point that marks the most recent changes in the payments ecosystem, it is necessary to analyze its historical evolution, from its origins to the present day.

Barter Era - The first payments ecosystem

The most basic payments ecosystem consisted of two fundamental players: the sender (payer) and the receiver (payee). The transaction was materialized through a physical means of payment, which acted as consideration for the economic value agreed between both parties for the exchange of goods or services. (see figure 3).

Metal Age - Coin as a standardized means of payment

The appearance of the first coins, which occurred in Lydia (in the west of present-day Turkey) in the middle of the 7th century B.C., represented a real revolution in the history of payments, giving rise to the so-called "Metal Age"[24] represented a real revolution in the history of payments, giving rise to the so-called "Metal Age". This period is characterized by two fundamental milestones: (see figure 4):

- For the first time, the three essential functions of money are unified in a single instrument: unit of account, medium of exchange and store of value[25].
- A new central player was incorporated into the payments ecosystem: the coin-issuing entity - known as the Mint - whose main function was to produce coins accepted as legal tender, guaranteed by a sovereign authority that ensured their authenticity, security and resistance to counterfeiting.

Mint

Although the first monetary issues arose as private initiatives, the backing of value provided by the coins minted by sovereigns progressively led to the issuance of currency, which became the exclusive prerogative of public authorities who, initially, used coins as a means of financing their own spending needs. Over time, coinage evolved into a monetary policy tool. The first interventions of the authorities on the alloy of coins constitute the historical background of the progressive decoupling of the nominal value of coins from their intrinsic value.

[23] BIS *Committee on Payments and Market Infrastructures - Fast payments – Enhancing the speed and availability of retail payments* (https://www.bis.org/cpmi/publ/d154.pdf).
[24] Glyn Davies (1919 - 2003: Professor of Economics at the University of Wales and economic advisor to the British government), *A History of Money: From Ancient Times to the Present Day* –2002.
[25] Pavlek, D. Wintersy, J. Morin, O. (2019) *Journal of Anthropological Archaeology Ancient coin designs encoded increasing amounts of economic information over centuries* https://doi.org/10.1016/j.jaa.2019.10110.

Figure 3. Basic payment through barter.

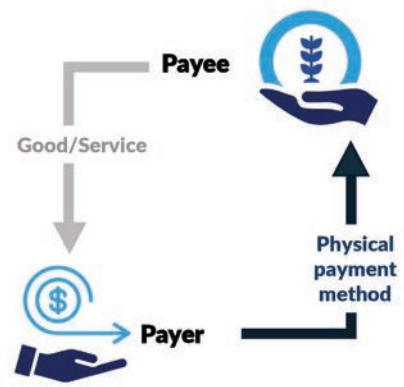
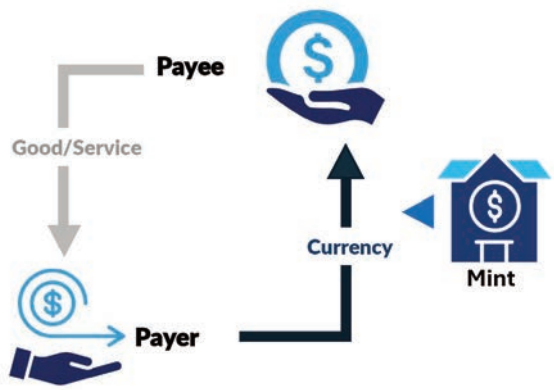


Figure 4. Payment through mint-issued currency.



Paper Era - Financial system dominates the payments ecosystem

Although paper money's earliest consolidated use occurred during the Song dynasty in the 11th century, it appeared in the 7th century during the Tang dynasty. This, coupled with the subsequent creation of central banks, constituted a second revolution in the history of payments, giving rise to the so-called "Paper Era". This period is characterized by several fundamental elements:

- Beginning of fiat money: The use of coins whose value no longer depends on their intrinsic composition, but on the trust placed in the issuing authority is introduced. Central banks begin to issue banknotes backed by gold or silver reserves, establishing the basis of the modern monetary system.

- Birth of contemporary payment services, aimed at providing users with capabilities such as:

  - Deposit and withdrawal of cash in bank accounts.
  - Sending funds through transfers between accounts.
  - Initiation of payment transactions by ordering entities instructed by payers.
  - Execution of payment operations in favor of debt collectors.
  - Issuance of payment instruments (bills, coins, cards, among others).
  - Aggregation and management of financial information.

- Consolidation of commercial banking: Beginning in the 17th and 18th centuries, commercial banking emerged as a centralizing agent in the execution of payment transactions. During this period, key innovations such as wire transfers were developed, and new correspondent banks and clearing and settlement houses emerged. Likewise, the payments ecosystem came to be regulated by rules established and supervised by central banks, with the aim of guaranteeing the security of transactions and the stability of the financial system as a whole. (see figure 5).

Correspondent bank

A correspondent bank is a financial institution that provides services in its own market to a foreign bank that is not headquartered in that country, or to any bank that lacks direct access to certain clearing or settlement houses. For this purpose, the bank requiring these services opens an account at the correspondent bank, called a "nostro account", from which payments and collections in the target market are centralized.

Clearing and Settlement Houses

Clearing and settlement houses are institutions in charge of processing payment transactions between financial institutions.

- Payment netting involves the netting of multiple collection and payment transactions, where the clearing house assumes the role of a central counterparty to reduce the risk of non-payment and simplify obligations between participants.

Figure 5. Payment by transfer.

History of means of payment: from barter to smart payments.

Throughout history, societies have adopted various means of payment to facilitate transactions and improve the quality of life. Reflecting the dominant business models and underlying mechanisms used to facilitate exchanges, the payments ecosystem has evolved through several stages: the Barter Era, the Metal Era, the Paper Era, the Plastic Era, the Account Era, and the current Decoupled Era (see Figure 6).

In its initial phase, the exchange of goods and services was carried out through barter, a system based on reciprocity and the coincidence of needs between the parties. However, the inherent limitations of this model - such as the difficulty of finding a counterpart with complementary needs - led to the appearance of the first coins with intrinsic value in Anatolia (modern-day Turkey) around the 7th century BC. This marked the beginning of the Metal Age. Initially minted in precious metals, coins gradually spread across various regions and, over time, began to be manufactured from materials of lesser value to meet the growing demand.

One of the most significant milestones in the evolution of payments was the creation of paper money in China around the 7th century, during the Tang dynasty, marking the beginning of the Paper Age. This instrument, with its value backed by a specific amount of precious metals, overcame some of the disadvantages of metallic coins, especially in terms of transportation and storage. Following the emergence of the first central banks in the 17th century, and with growing importance during the 18th century, paper money became the primary means of payment, giving rise to the fiduciary system, where banknotes were issued by banks and backed by gold or silver reserves. At this stage, payments were mainly made with cash and paper documents, such as checks and money orders. In 1872, the Western Union company innovated with the first money transfer service via telegraph, allowing funds to be sent remotely using code books and passwords, marking a significant advancement in payment services.

Some 1,300 years after the introduction of paper money, a new instrument emerged: the payment card, ushering in the Plastic Age. The first card was issued in 1914, when Western Union[1] offered its customers a no-fee line of credit. Later, in the 1950s, Diners Club cards were introduced[2] , acting as an intermediary between restaurants and customers to defer payment for consumption, charging a fee for the service. This is considered the origin of the modern credit card.

The Plastic Era was marked by the widespread use of debit and credit cards, which introduced three major innovations: the possibility of making cashless payments, the option of accessing credit for deferred purchases, and, decades later, the ability to make purchases online. This development played a key role in the internationalization of retail trade. On the technical front, advances such as the magnetic stripe (1969) were introduced, followed by additional security features such as the personal identification number (PIN) and embedded chips to protect users' funds.

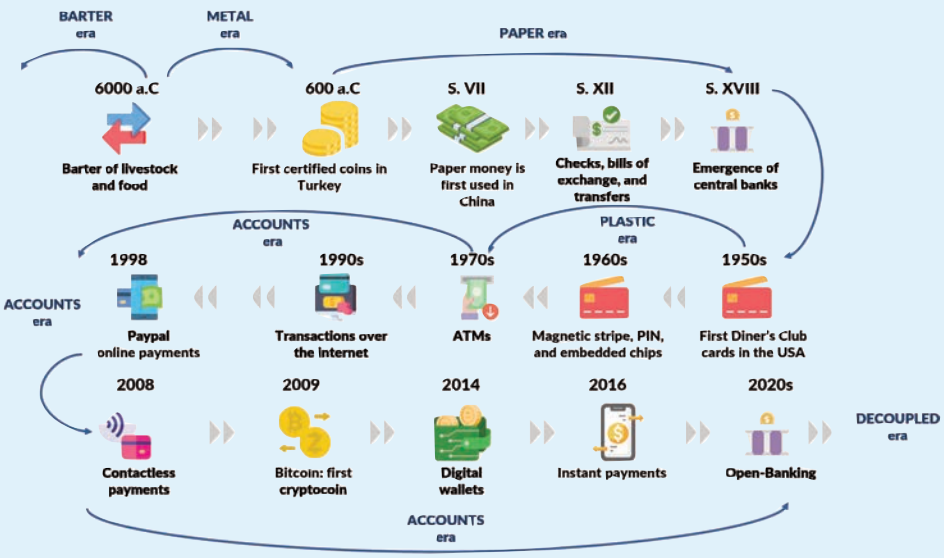
Beginning in the 1990s, the expansion of the Internet and digital technologies gave rise to online banking and electronic payments, ushering in the Accounts era. Users could now make payments and purchases without physically visiting a point of sale, reducing their reliance on physical cards. A pivotal development during this period was the founding of PayPal in 1998, considered the first major modern fintech. Initially conceived to facilitate transfers between PDA devices[3] , the company evolved into a platform for payments between individuals and businesses over the Internet, radically transforming the global payments ecosystem.

Currently, the payments ecosystem is transitioning into a new phase, often referred to as the Decoupled Era. This stage is characterized by the increasing decoupling of payments from traditional bank accounts. Emerging technologies such as artificial intelligence, blockchain and tokenization have redefined the payments infrastructure, enabling innovations such as digital wallets and standalone applications, largely driven by technology companies outside the banking sector.

In the future, a greater decentralization of means of payment is expected, driven by the expansion of cryptocurrencies and digital currencies issued by central banks (Central Bank Digital Currencies, CBDCs). These developments are set to structurally transform how financial transactions are carried out, validated and managed on a global level.

[1] 6 fascinating things about Western Union's history - Blog | Western Union.
[2] History and Legacy | Diners Club International.
[3] PDAs (Personal Digital Assistants) were portable electronic devices designed to function as digital personal organizers. They were popular before the rise of smartphones, especially during the 1990s and early 2000s.

Figure 6. Summary of the historical evolution of monetary transactions.



- Settlement consists of the actual execution of the movement of funds between bank accounts.

Over time, clearing and settlement houses have expanded their functions to include the provision of collateral and liquidity facilities, thus strengthening the stability of the financial system.

Plastic Era - A new means of payment is born: the card

In the mid-20th century, the appearance of the first payment cards marked the beginning of the so-called "Plastic Era", constituting the third major revolution in the payments ecosystem. This breakthrough introduced two fundamental transformations:

- For the first time, merchants were able to directly access the funds available in the customer's account, without the need to resort to checks, cash or bank transfers.

- Although the new model required the incorporation of new players into the ecosystem, the primacy of the financial system was maintained, articulated around the following actors (see figure 7):

    - Issuers.
    - Acquirers.
    - Card networks.
    - Payment processors.
    - Payment gateways.
    - Payment facilitators (Payfacs).

Issuers

Issuers are financial institutions that issue credit or debit cards on behalf of card networks. Their role includes verifying the cardholder's identity and guaranteeing sufficient funds to authorize the transaction, thereby assuming credit and operational risks.

Acquirers

Acquirers are financial institutions that process card payments at merchant locations. They act as intermediaries between the merchant and the issuer, accepting payment from the customer and then transferring the funds to the appropriate issuer. Some acquirers may also operate as payment processors or Independent Sales Organizations (ISOs), both international (e.g. Fiserv, Adyen) and domestic (e.g. Transbank in Chile, Cielo in Brazil).

Card networks

Credit card networks - such as Visa, Mastercard, American Express or Discover - are organizations that connect issuers, acquirers, merchants and consumers. Their role is to:

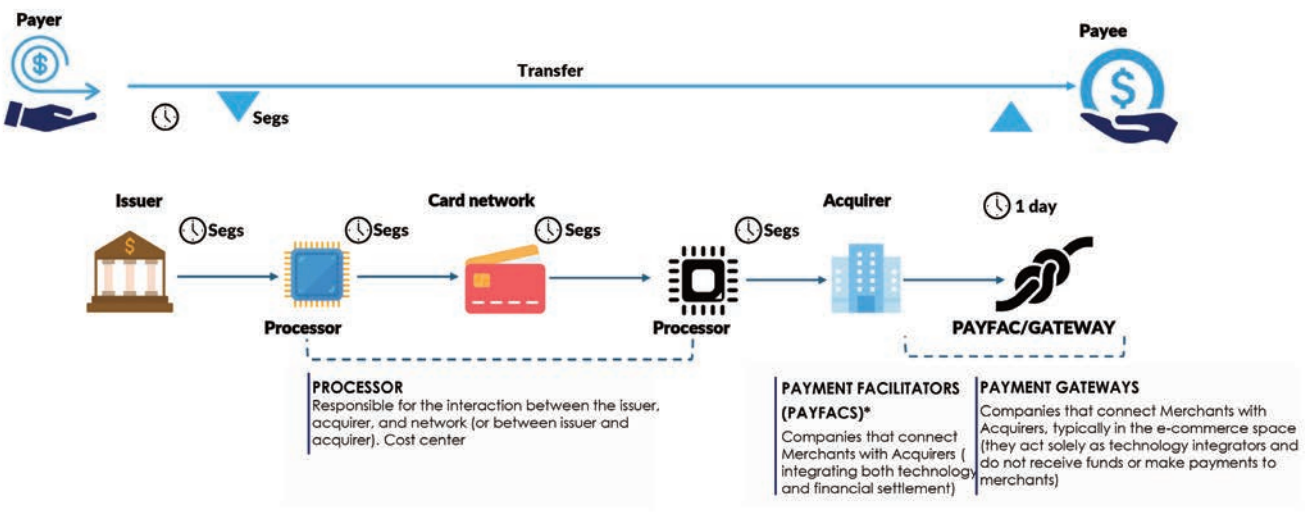
- Transmit transaction data between the parties involved.

- Supervise the settlement and clearing processes.

- Establish network operations and compliance policies.

These networks have contributed significantly to the international standardization of payments, allowing a previously fragmented ecosystem - where payment instruments were valid only in national contexts - to evolve into an interoperable environment on a global scale.

Figure 7. Card payments.



Payment processors

Payment processors are companies that provide electronic transaction processing services. Their functions include:

- Establishment of commercial accounts.
- Data transmission.
- Authorization of credit, debit and prepaid card transactions.
- Management of reimbursements.
- Application of fraud detection mechanisms.

There are two main types:

- Front-end processors, which route transactions to the issuing bank for authorization (e.g. Redsys in Spain, SIBS in Portugal).
- Back-end processors, which settle authorized transactions and transfer the funds to the merchant's bank (such as PayPal, Stripe or Adyen).

Payment gateways

Payment gateways are technology platforms that enable merchants to accept card payments - either online or at physical points of sale. Their function is to connect the merchant's website with the payment processor and issuer, encrypting the transaction information to ensure its security. Common examples include Stripe, PayPal and Flow.

Payment Facilitators (PayFacs)

Payment Facilitators or PayFacs are intermediaries between acquirers and merchants that simplify the onboarding process, especially for small and medium-sized businesses. Their model allows merchants to quickly integrate without the need to establish a direct relationship with an acquirer, thus optimizing the digital payment acceptance experience (see Figure 2). Common examples are Shopify Payments, Amazon Pay or Kushki (see Figure 8).

Definition of payment services.

Payment services encompass a range of financial products and services that enable individuals and companies to conduct the financial transactions necessary for their economic operations, as well as manage their liquidity and associated risks.

There are international regulations that cover both the payments ecosystem in general and payment services in particular. For example, the European PSD2 Directive[1] (Second Payment Services Directive) defines the following business activities as payment services:

- Services that allow the deposit and withdrawal of cash into or from a payment account, along with all operations necessary for managing these activities.
- Remittance of money and execution of payment transactions, whether or not the funds are covered by lines of credit, including:
  - Transfer of funds between different payment accounts.
  - Direct debits, whether recurring or non-recurring.
  - Payment transactions made by means of cards or similar devices.
- Issuance of payment instruments and/or acquisition of payment transactions.
- Payment initiation services.
- Account information services.

In Europe, the transposition of this directive into national legal systems has enabled the adoption of a uniform definition across all Member States. An example of this is Royal Decree-Law 19/2018[2] in Spain. Likewise, the regulation issued by the European Central Bank (ECB) on oversight requirements for systemically important payment systems[3] has helped align oversight criteria in this area.

Furthermore, other legislation from different regions maintains substantial consistency with this definition. This includes the United Kingdom´s Treasury regulations (Payment Services Regulations or PSRs)[4] , the regulations issued by the Federal Reserve Board in the United States[5] , as well as the regulations enacted by the main central banks in Latin America, such as the Payment System Law in Mexico[6] and the regulations applicable to the Brazilian Payment System[7].

[1]Directive 2015/2366 of the European Parliament and of the Council on payment services, art. 4 and Annex I.
[2]https://www.boe.es/eli/es/rdl/2018/11/23/19.
[3]European Central Bank: Regulation - 795/2014 - EN - EUR-Lex (europa.eu).
[4]The Payment Services Regulations 2017 (legislation.gov.uk).
[5]Federal Reserve Board - Policies: The Federal Reserve in the Payments System.
[6]Ley DOF 12-12-2002 de Sistemas de Pagos de México (https://www.diputados.gob.mx/LeyesBiblio/pdf/255.pdf).
[7]Rules of the Brazilian Payment System (SPB) created by Law No. 10 214/2001, Regulation No. 150/2021.

Era of Accounts - Disruption brought about by e-commerce

The emergence of the Internet at the end of the 20th century introduced a new disruptive factor - the fourth major milestone in the evolution of the payments ecosystem - by enabling the development of electronic commerce (e-commerce). This phenomenon quickly highlighted the inadequacy of traditional means of payment to meet the demands of the new digital environment, giving rise to what is known as the "Age of Accounts".

In September 1995, Canadian Mark Frazer made a historic purchase: a defective laser pointer acquired through a website called Auction Web. This transaction would become the first sale recorded by this platform, which years later would be renamed eBay. Founded just two months after Amazon, eBay would become one of the emblems of the e-commerce revolution that burst onto the scene at the end of the 1990s with the expansion of the World Wide Web.)

It is very likely that Frazer himself, like other early buyers, immediately experienced the limitations of existing payment methods. During the early years of e-commerce, most transactions were settled by sending checks or even cash by postal mail. Thus, the immediacy promised by the new digital environment was thwarted by slow, insecure and inefficient collection procedures that offered no guarantees either for the buyer (who had to pay before receiving the product) or for the seller (who had to ship the goods with no guarantee of collection).

Friction in the payment experience quickly became a major concern for large e-commerce platforms. In response, eBay sought to develop a solution of its own and, in 2000, launched Billpoint, a payment system powered by a start-up acquired the previous year, in a strategic alliance with Wells Fargo bank. This decision reflected the continued reliance on the traditional financial sector as a natural provider of payment services, given its hegemony over the previous two centuries.

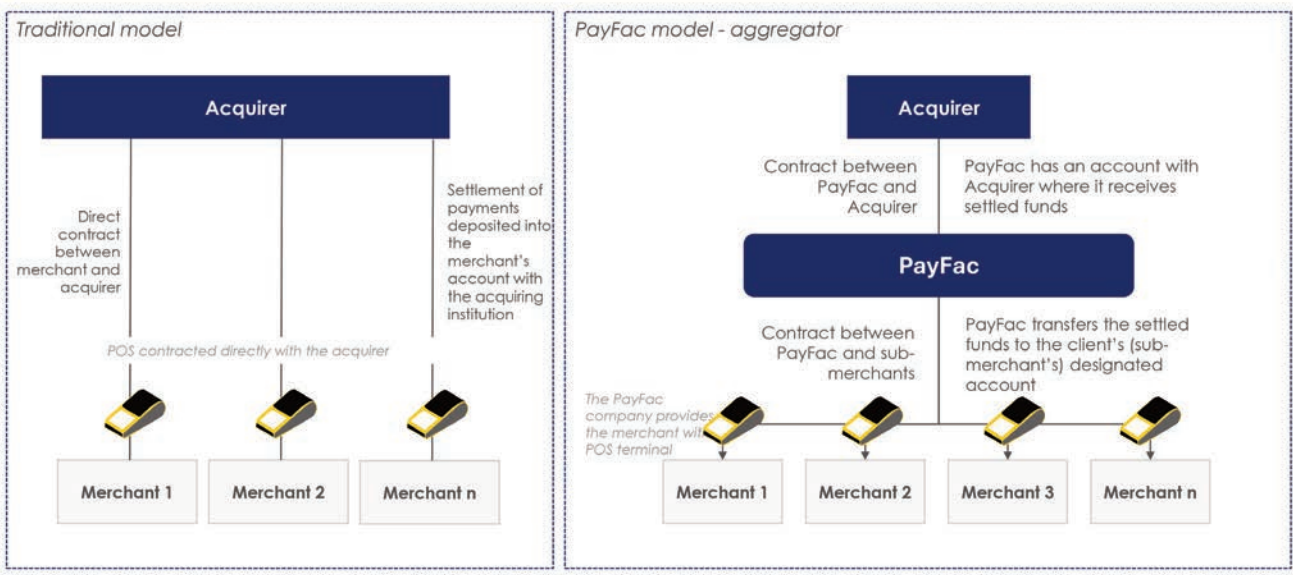
However, Billpoint failed to gain traction. Despite eBay's backing, users found an emerging technology solution outside the banking sector more convenient: PayPal[26], founded in 1998. PayPal's success marked a turning point in the history of the payments ecosystem by demonstrating that technology companies were in a position to compete with - and surpass - traditional players in the provisioning of innovative solutions.

Considered by many as the first modern fintech, PayPal symbolizes the moment when the financial system loses its monopoly over payments and begins to share the limelight with new players driven by digital transformation.

Over the last three decades, the payments industry has undergone a dizzying evolution. The rise of e-commerce and increasing digitalization generated expectations and needs among users that traditional financial institutions were only able to satisfy through profound organizational and technological transformations. This situation opened the way for the entry of new competitors, many of them from Silicon Valley, the epicenter of the contemporary technological revolution. As a result, the payments ecosystem has become one of the most innovative and dynamic sectors of the global financial system.

[26]PayPal's Place in FinTech: From Industry Pioneer to Modern Innovator, Jade Dagher Bentley University. Article available in the Social Science Research Network (SSRN).

Figure 8. Traditional relationship model between acquirers and merchants vs. relationship model using a PayFac.



Decoupled Era - Decentralization of financial services

Currently, several experts and monetary authorities agree that we are entering a new stage in the evolution of the payments ecosystem. This phase has been referred to by different names, such as "Decoupled Era", "Era of Digital Money", "Era of the Interoperable Ecosystem" or "Era of Programmable Accounts and Payments"[27]. In all cases, this stage represents a transformation that transcends the simple possession of a bank or digital account, and is characterized by automation, interoperability, the use of digital intelligence and the increasing decentralization of financial services.

In this new context, the very concept of currency is being redefined with the emergence of private cryptocurrencies - such as Bitcoin or Ethereum - and public digital currencies issued by central banks, such as the digital euro[28]. These innovations not only transform the way value is transferred, but also introduce new paradigms of monetary policy and financial supervision.

The fifth disruptive factor in the evolution of the payments ecosystem is considered to be precisely this decentralization of financial services. This structural change implies a profound transformation in the way financial services are designed, offered and consumed. Unlike traditional models based on centralized institutions - such as banks, stock exchanges or insurance companies - decentralization uses technologies such as blockchain and smart contracts to enable direct transactions between users, eliminating the need for intermediaries.

This new paradigm enables more agile, programmable and transparent financial structures, where the processes of validation and execution of payments, loans, investments or insurance can be carried out automatically and securely, through algorithms and distributed platforms. The following table shows a comparison between traditional finance and decentralized finance based on the most relevant parameters that define the functioning of the payments ecosystem (see figure 9).

[27] "We are transitioning to an ecosystem where money is not only digital, but also programmable, interoperable and smart. This is a new paradigm in the architecture of money." - BIS, Blueprint for the future monetary system, 2022 https://www.bis.org/publ/arpdf/ar2022e.pdf.

[28] "The digital euro, one of the main Central Bank Digital Currencies (CBDCs) envisioned, would be a digital currency of the European Central Bank. Designed as an electronic equivalent to cash and would thus complement banknotes and coins, it seeks to provide citizens with an additional choice on how to pay" - European Central Bank - Digital Euro: Frequently Asked Questions (https://www.ecb.europa.eu/paym/digital_euro/html/index.en.html).

Figure 9: Comparison between traditional and decentralized finance.

	Traditional finance	Decentralized Finance
Intermediaries	Banks, stock exchanges, insurance companies, regulated entities	Automated protocols in blockchain (smart contracts)
Infrastructure	Centralized and based on private servers	Decentralized and on public blockchain networks
Custody of assets	Generally in the hands of a financial institution or intermediary	Self-custody (non-custodial) and under the control of the individual
Transparency	Partial: depends on the regulator or audits	Complete: public code and transactions on blockchain for all agents with access
Regulation	Strong, issued by national and supranational authorities	Little to no direct regulation at present (evolving)
Operating speed	Subject to internal schedules and processes of both intermediaries and central clearing houses (e.g., cut-off times and working days)	24x7, global and with no time restrictions
Main risks	Operational failures, counterparty risk, stringent regulation	Code errors, cybersecurity and hacks, volatility, lack of legal backing
Governance	Governments, central banks and financial institutions	Users via governance tokens - Decentralized Autonomous Organization (DAOs)

Current situation of the payments ecosystem: Transition towards the "decoupled era"

"I thought we could have an incredibly efficient payments system that was more secure and had less friction than traditional methods".

A paraphrase of Elon Musk's ideas, referring to his original vision for X.com, which later merged with Confinity to form PayPal.

As mentioned above, we are currently moving towards the so-called "Decoupled Era", characterized by universal, instant and interoperable access to digital payments through open accounts and technologies and in a context where cash, transfers and traditional cards are no longer the central axis.

The current payments ecosystem:

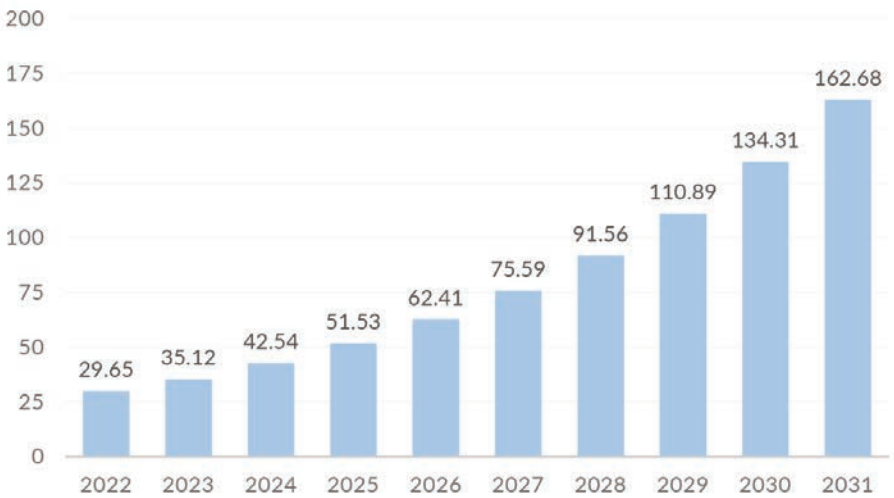
- Highly digitalized and constantly evolving, driven by changes in consumer behavior.
- Characterized by the coexistence of "tradition" and "innovation":
  - Seamless integration between traditional digital payment methods (such as wire transfers or credit and debit cards) and emerging solutions such as digital wallets, mobile payments (integrated or invisible), cryptocurrencies and Buy Now, Pay Later (BNPL) services.
  - Increasing competition between traditional players (banks) and new entrants (fintech and technology giants) fostered by regulation aimed at opening up the market while maintaining a balance between consumer protection and fostering innovation.
- Marked by a strong trend towards interoperability and decentralization:
  - Interoperability and instantaneous transactions (real-time payments).
  - Decentralization of financial services, enabling more agile, programmable and transparent structures.
- It is attractive and has growth potential.

A digitized and evolving payments ecosystem driven by changes in consumer behavior

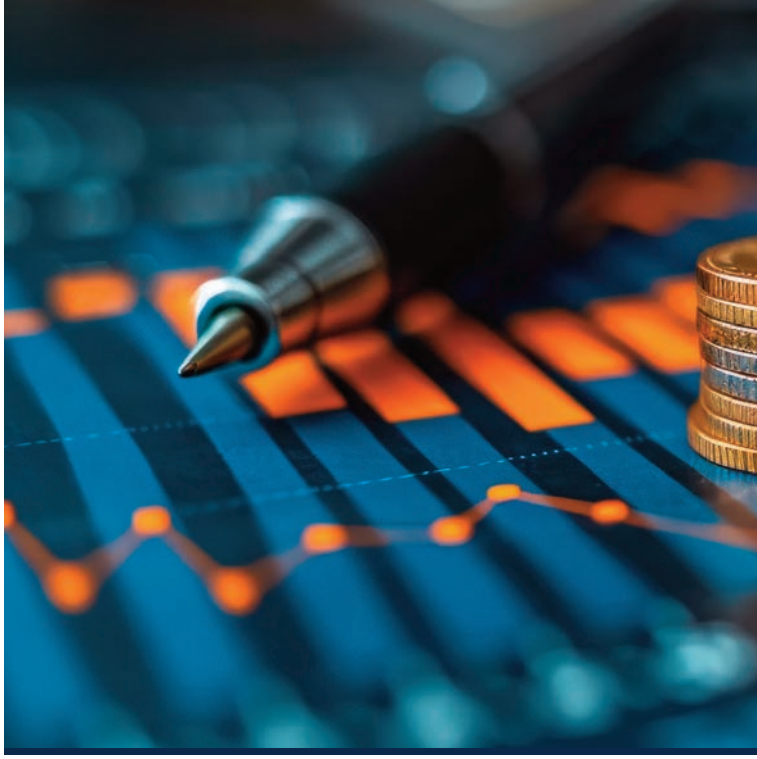
From a demand perspective, consumers are becoming increasingly sophisticated and digital, demanding dynamic payment solutions that adapt to their consumption styles. This trend is manifesting itself in all segments: retail, small and medium-sized enterprises, and large corporations. Digitalization is now a fundamental element in our daily lives, transforming the way we interact, work and entertain ourselves. The payments ecosystem cannot remain indifferent to this evolution, driven by advances in online banking and the development of mobile applications. These innovations have facilitated the transition from physical payment methods (cash, checks, physical cards) to digital payments, made over the Internet or through electronic devices - a shift confirmed by numerous studies:

- The global market for online payment platforms reached a value of US$29.65 billion in 2022 (see Figure 10).

Figure 10. Market size of global online payment platforms between 2022 and 2031(in billions of dollars).



Source: InsightAce Analytic, Statista.



- According to data from the Bank for International Settlements (BIS) for a sample of 26 countries[29], there has been a significant increase in the value of cashless payments. Notably, South Africa, Canada, and Turkey have experienced particularly strong growth, with increases of 52.6%, 26.8%, and 26.7%, respectively, in the volume of payments made with cards and electronic money in 2023 compared to 2022.

- Several organizations have expressed similar views:

  - **In the Eurozone,** according to data from the Banco de España, the use of non-cash payment methods increased by 18.6% in 2021[30] (197 billion euros).

  - **In the United States,** the value of digital payments, according to studies published by the FED[31] , grew at an annual rate of 9.5% between 2018 and 2021, reaching $128.51 trillion in 2021. This increase was more than twice the growth recorded between 2015 and 2018 and more than three times that of the 2000-2015 period.

  - **In South America,** according to data published by the Inter-American Development Bank (IDB) in its report "Accelerating Digital Payments in Latin America and the Caribbean"[32], digital payments became the preferred method of payment, growing by 18% in 2020.

  - **In Asia,** according to data from "The Asian Banker" (a company specializing in providing strategic intelligence, research and community platforms for the financial services industry in the Asian region), the regional digital payments market is projected to grow from $12.29 billion in 2023 to $22.97 billion in 2028, at a compound annual growth rate of 13.32 % .

This shift in consumers' cash usage habits raises questions about the potential disappearance of cash. In this context:

- The most recent studies suggest that cash and digital payments will continue to coexist in the future. By way of illustration, the European Central Bank's SPACE study[33] reveals that:

  - Cash was still the most used payment method at the point of sale in 2022 (59 % of transactions), although its use was already showing a downward trend compared to 2016 (79 %) and 2019 (72 %).

  - In terms of value, cards accounted for 46% of transactions in 2022, surpassing cash (42%). This marked a shift compared to previous years, when cards accounted for 39% of transactions in 2016 and 43% in 2019, trailing cash (54% and 47%, respectively).

  - Despite increasing digitalization, a significant number of Eurozone citizens continue to opt for cash, regardless of their sociodemographic profile.

  - According to a study by the European Central Bank, there is no direct correlation between access to digital services and a decrease in cash usage. This suggests that the persistence of consumer habits plays a fundamental role.

- In addition, cash continues to serve as a contingent asset, as a fully digital payments ecosystem would rely heavily on various external factors. Among the most relevant are the following:

  - Power supply, essential for the continuous operation of data centers, payment terminals, mobile devices and servers.

  - Internet connectivity, essential for data transmission, transaction validation and interoperability between systems.

  - Mobile communications networks, necessary both for the execution of mobile payments (e.g., via NFC, QR codes or applications) and for sending notifications and validation via two-factor authentication mechanisms, such as SMS.

  - Data center infrastructure, which in many cases is hosted in cloud computing environments, and on whose availability the operational continuity of the system depends.

  - DNS services and digital certificates, essential for domain name resolution, SSL/TLS validation and secure operation of application programming interfaces (APIs) and web services.

[29] *Retail payments, currency and related indicators publication table:* BIS,CPMI_CT8B,1.0.
[30] Payment statistics: 2021 (bde.es).
[31] Federal Reserve Board - Federal Reserve Payments Study (FRPS).
[32] IDB Lab, and World Economic Forum (2022). Accelerating digital payments in Latin America and the Caribbean. https://doi.org/10.18235/0004256
[33] European Central Bank, *"Study on payment attitudes of consumers in the euro area (SPACE)"*, 2022.

A payments ecosystem where "tradition" and "innovation" live side by side

Seamless integration between traditional digital payment methods and emerging solutions

In the current context, the payments ecosystem is evolving towards a hybrid architecture in which traditional digital methods - such as bank cards, wire transfers or point-of-sale (POS) payments - coexist and complement each other with emerging solutions, such as digital wallets, account-to-account (A2A) payments, mobile payments, cryptocurrencies or Buy Now, Pay Later (BNPL) deferred payments.

This seamless integration allows users to move seamlessly between different payment methods, according to their convenience, context or need, while merchants and financial providers incorporate technologies that facilitate interoperability, security and transaction efficiency. Thus, the system no longer revolves around a single dominant payment method, but is moving towards a multichannel, adaptable and inclusive experience, where digital becomes the standard, without completely displacing more established infrastructures.

For a better understanding, the following is a brief description of the most relevant emerging solutions:

- Digital wallets (wallets or electronic wallets): Mobile apps that allow users to store money, which can be recharged in cash or through other payment methods, without the need for a bank account. Some examples of digital wallets include: PayPal Cash (recharge in associated stores); Mercado Pago (recharge in kiosks) or RappiPay Cash (recharge in physical points).

Main types of invisible payments.

- Background Payments - Uber or Lyft when requesting a ride: The payment is processed automatically, without the user having to take any explicit action at the time of the transaction.
- Subscription or Membership Payments - Netflix or Spotify: User gives initial consent and payments are made automatically at set intervals.
- Biometric Identification Based Payments - Apple Pay and Samsung Pay with Face ID or Fingerprint: The user authorizes and makes the payment using biometric data such as fingerprint, facial recognition or retina scan.
- IoT (Internet of Things) Payments - Smart refrigerators that automatically order food replenishment or vehicles that automatically pay tolls, fuel or parking: Connected devices that perform automatic ordering and payment without direct human intervention.
- Contextual Payments - Urban mobility apps that detect available parking spaces and pay for you: The system detects user context (location, activity, history) to make or suggest automatic or one-click payments.
- Invisible Payments in Autonomous Commerce - Amazon GO where the customer enters, takes products and leaves and the system detects what they take and automatically bills their account: Stores that eliminate the traditional act of paying at checkout.
- Virtual Assistant Based Payments - Alexa or Google Assistant ordering products or services after a voice command: Use of voice assistants or chatbots to make purchases and payments automatically.

- Account to account (A2A) payments: These facilitate the direct transfer of funds between accounts (typically virtual), without the need for bank intermediaries. According to the World Payments Report 2023, A2A payments are the preferred method for P2P (person-to-person) transactions for 45% of users.

- Mobile payments (embedded or invisible): Payments initiated directly from a phone or similar device with embedded technologies, allowing the payment process to become a seamless part of the experience rather than a separate transaction:

  - Integrated payments: Refers to the seamless incorporation of the payment function within platforms or applications, eliminating the need to change environments.

  - Invisible payments: Transactions where the act of paying is performed in such an integrated and automated way that the user barely perceives that he or she is paying, thus almost completely eliminating friction in the shopping experience.

- Cryptocurrencies: Virtual assets that function as a medium of exchange, unit of account and store of value, lacking physical support. There are three types of digital currencies:

  - Cryptocurrencies: Private and blockchain-based, with their value directly tied to the fluctuation of supply and demand. The most well-known are Bitcoin and Ethereum, which together account for approximately 75% of the cryptocurrency market.

  - Stablecoins: Private digital currencies linked to stable assets, which helps mitigate volatility. Their value fluctuates in line with the asset they are tied to. Examples include:

    - USDC (USD Coin) - Linked to USD and backed by cash reserves and short-term US Treasury bonds. It is designed to maintain an exact parity of 1 USDC = 1USD.

    - EUROC (Euro Coin) - Linked to EUR and backed by euro reserves held in regulated banks . It is also designed to maintain an exact parity of 1EUROC = 1EUR.

    - PAXG (Paxos Gold) - Linked to gold, each PAXG token is backed by one troy ounce of physical gold stored in professional vaults in London (Brink's).

  - Central Bank Digital Currencies (CBDCs): Public, digital forms of money issued electronically by a central bank.

  - Buy Now, Pay Later (BNPL) deferred payments: Financing model, generally offered by Fintechs, that allows payments to be split or deferred at physical or online points of sale without the need to make a formal credit application.

Increasing competition between traditional and new players as a result of regulation aimed at market opening and consumer protection

The current state of the payment services industry is also shaped by its regulatory framework. Over the last decade, Open Finance has emerged as the new regulatory paradigm that currently governs the payments industry.

Although Open Finance models cover broader areas than just payments, it was in this sector that the regulatory focus was first placed, particularly with the introduction of PSD2 in Europe, a pioneering standard that set the stage for broader reforms. By December 2024, sixty jurisdictions had approved regulations related to Open Finance, and ten more were in the process of approval[34] (see figure 12).

The Open Finance regulations aim to address two main objectives:

- Promote more open models of competition and participation in the market. In this sense, regulations can be divided into two broad categories, depending on their level of interventionism:

  - Mandatory models, such as the one established in the European PSD2 or in the Mexican Fintech Law, where a mandatory regime for accessing customers' bank accounts is imposed. All financial institutions are required to participate in this scheme.

  - Voluntary models, such as those developed in Japan and Singapore, where collaboration and data transfer between financial institutions is based on voluntary agreements.

[34] CCAF (2024), The Global State of Open Banking and Open Finance, Cambridge: Cambridge Centre for Alternative Finance, Cambridge Judge Business School, University of Cambridge.

Cryptocurrencies: Origin, operation, advantages and disadvantages.

Origin:

On October 31, 2008, with the publication of "Bitcoin: A Peer-to-Peer Electronic Cash System"[1] by Satoshi Nakamoto, the concept of digital currency or cryptocurrency emerged for the first time.

Operation:

Cryptocurrencies operate on the basis of blockchain technology, which allows transactions to be carried out directly between two parties without the need for intermediaries through the use of cryptography and a decentralized network of computers to validate and record transactions. The operation can be illustrated as shown in Figure 11.

Advantages:

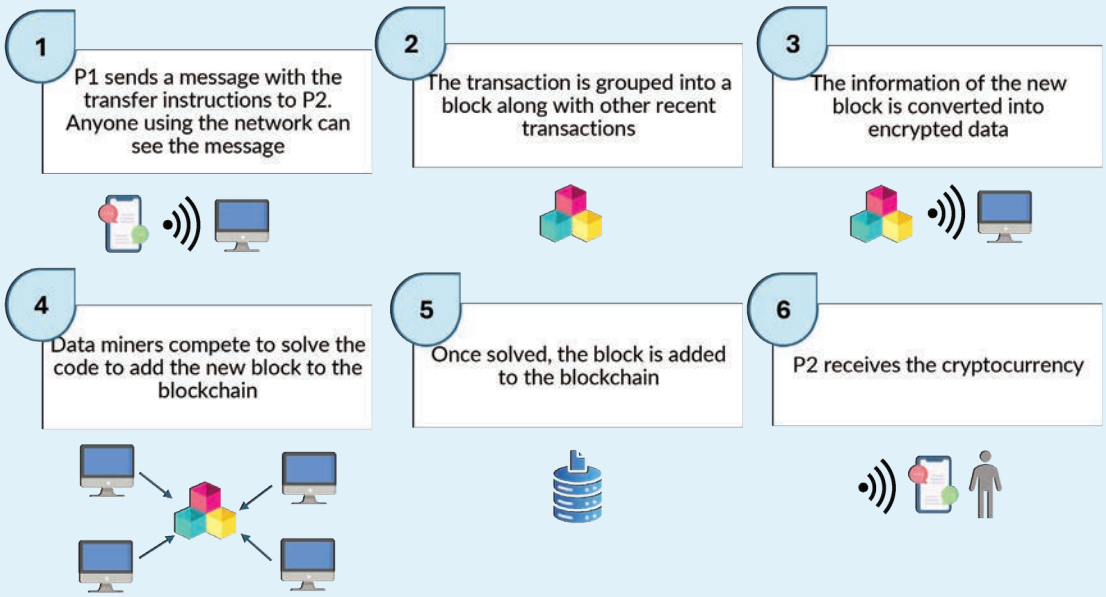
- Settlement speed.
- Reduced costs, especially in the case of cross-border fund transfers, since currency conversion needs are eliminated.
- Multiplatform operability.
- 24/7 availability.
- Facilitator of financial inclusion in unbanked areas by requiring only Internet access.
- No restrictions on amount or volume.
- High efficiency through tokenization and smart contracts.

Disadvantages:

- Very complex usage and environment:
  - Oversupply. According to CoinGecko[2] , an independent cryptocurrency data aggregation platform, there are more than 10,000 active cryptocurrencies, each with its own operating scheme.
  - Very high level of price volatility.
  - Steep learning curve.
  - Technical complexity for average users.
- Security and fraud risks.
- Operational risks due to errors in wallets or networks.

[1]https://bitcoin.org/files/bitcoin-paper/bitcoin_es.pdf.
[2]https://www.coingecko.com/es/publications/reports.

Figure 11. How do cryptocurrency transactions work?



Among the advantages argued in favor of the mandatory model are:

- Increased competition by lowering barriers to entry for new players.
- Promotion of innovation, fostering more efficient and competitive markets.
- Cost reduction and improvements in the quality of payment services.

However, there are also disadvantages associated with the mandatory model, including regulatory asymmetry: it facilitates the entry of entities subject to lower levels of supervision and regulatory burden, to the detriment of traditional financial institutions, which must shoulder greater obligations and additional costs – costs that, in many cases, cannot be monetized.

Strike a balance between regulation and innovation. In the face of rapid technological change, it's crucial to provide a regulatory framework that protects consumer rights without imposing an excessive burden that stifles innovation and hampers technological advancement.

In this regard, it should be noted that one of the main risks that PSD2 sought to mitigate was that associated with the loss of control over data by customers and financial institutions. Techniques such as screen scraping - data extraction from electronic banking platforms using the customer's banking credentials - prevented financial institutions from knowing who accessed the data and what information was shared. At the same time, customers lacked effective control over the access to and destination of their data, exposing them to significant security risks.

The solution driven by the Open Finance model has been to encourage financial institutions to adopt application programming interfaces (APIs). These interfaces enable third parties to access customer bank account information under controlled conditions, ensuring that:

- Financial institutions maintain control over what information is shared and with whom.
- Access to information is always granted with the explicit consent of the client.

A payments ecosystem with a strong trend towards interoperability and decentralization

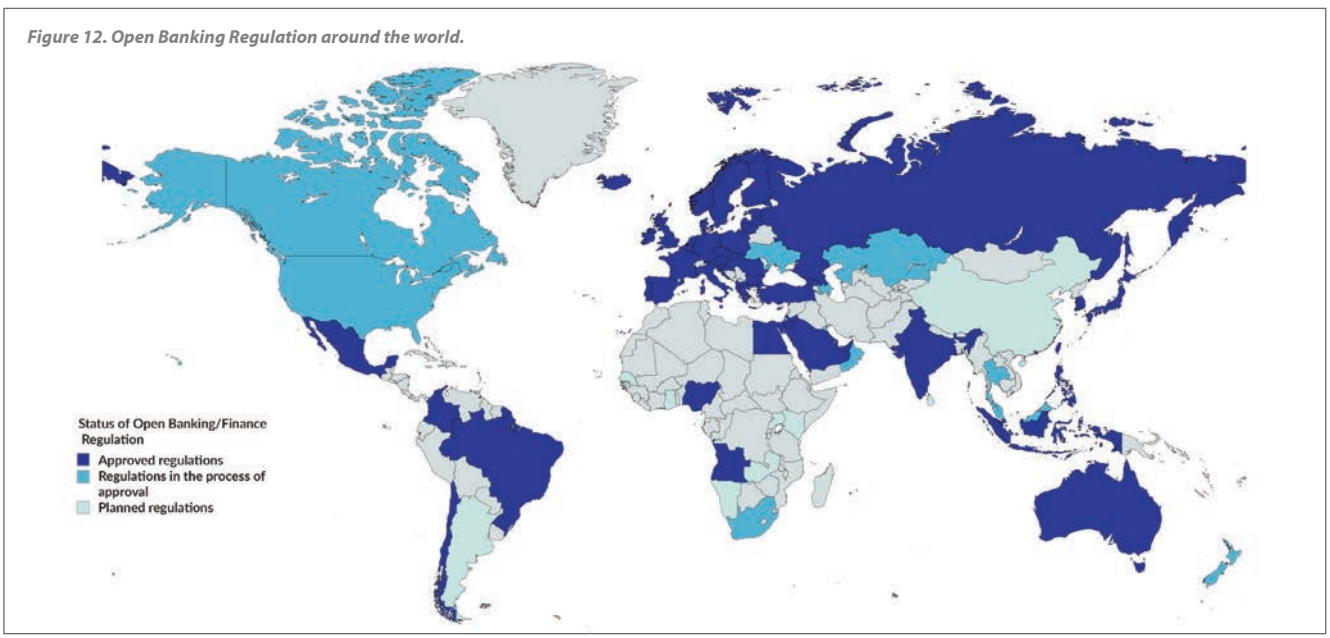
Interoperability and instantaneity of transactions (real-time payments)

The speed and 24/7 availability of e-commerce in a digital environment has driven an accelerated evolution of the payments industry towards digitalization. However, mere digitalization is not the only customer requirement; transaction immediacy has become a core demand, guiding the industry into the era of instant payments.

Since 2012, when Sweden's six major private banks launched Swish Pay[35] – a mobile platform that connects the user's phone number with their bank account to facilitate real-time transactions – numerous countries have developed their own national instant payment systems, such as:

[35]Data Reportal (2021).

Figure 12. Open Banking Regulation around the world.



Differences between Buy Now Pay Later (BNPL) and traditional installment payment.

Although both allow a payment to be spread over time, they have important differences in structure, access, cost and customer experience:

Feature	Buy Now, Pay Later (BNPL)	Traditional Installment Payments
Who offers it	Fintechs or payment platforms (e.g. Klarna, Afterpay, Affirm, Zip, Mercado Pago in LatAm).	Banks, traditional finance companies or credit card issuers.
Contracting Process		
Access	Immediate & integrated into the checkout process of the online or physical store.	Requires signing a credit or loan agreement with a bank or finance company.
Credit evaluation	Rapid assessment through real-time scoring algorithms based on internal history of past purchases and payments, behavioral data and identity and device verification with dynamic limits that adjust as the user's payment behavior history becomes available.	Formal evaluation: credit history, proof of income, risk analysis.
Documentation	Usually just an email, phone and payment method is required.	Requires more extensive documentation (ID, income, financial).
Terms of Payment		
Duration	Short term (typically repaid in 4 to 6 installments or within 30-90 days).	Medium or long term (spread over several months to years).
Cancellation flexibility	As easy as signing up, processed digitally in just a few steps.	Less flexible: requires renegotiation or formal cancellation.
Amount	Focused on small to medium sized purchases (from $50 to $2,000 typically).	It is normally used for higher amounts (appliances, cars, mortgages).
Financial cost		
Interest	Most plans offer 0% interest to the customer, with the cost typically borne by the retailer and included as part of their sales margin.	Normally with explicit interest rates from the beginning of the contract.
Penalties	Moderate late fees.	Normal penalties and impact on credit history.
User experience		
Speed	Fast, seamless, designed not to interrupt the shopping experience.	Slow, requires formal procedures.
Integration	Integrated into e-commerce checkout, apps, or directly at physical points of sale.	It is arranged separately, often not at the same point of purchase.

- Blik in Poland (2015).
- Bizum in Spain (2016).
- Paylib in France (2016).
- UPI in India (2016).
- Pix in Brazil (2020).
- Dimo in Mexico (2024).

However, it was not until about five years ago that the world's main financial regulators began to promote initiatives to establish cross-border instant payment systems using the SWIFT network. These include:

- Europe: One-Leg-Out Instant Credit Transfer (OCT Inst)[36], launched by the European Payment Council (EPC) in November 2023, enables payments in euros to be sent and received instantly 24 hours a day. From October 2025, it will include end-to-end traceability of payments.

- North America: FedNow Service, launched in July 2023 by the U.S. Federal Reserve, offers continuous availability, immediate funds transfer, irrevocability of transactions and data enrichment[37].

- South America: Pix, from the Central Bank of Brazil, is moving forward in the development of offline and international payments, with the goal of enabling instant cross-border payments by 2025[38].

- Asia: India's Unified Payments Interface (UPI) initially launched in 2016, has evolved into a robust instant payments system and has established agreements for instant cross-border transactions with France, UAE and Singapore.

A real-time payment (RTP) process does not differ in its main stages from other payment processes (see Figure 13), but it must be completed within seconds – posing significant challenges:

- Technology: The infrastructure must support real-time communications, which requires the implementation of APIs and the modernization of legacy systems.

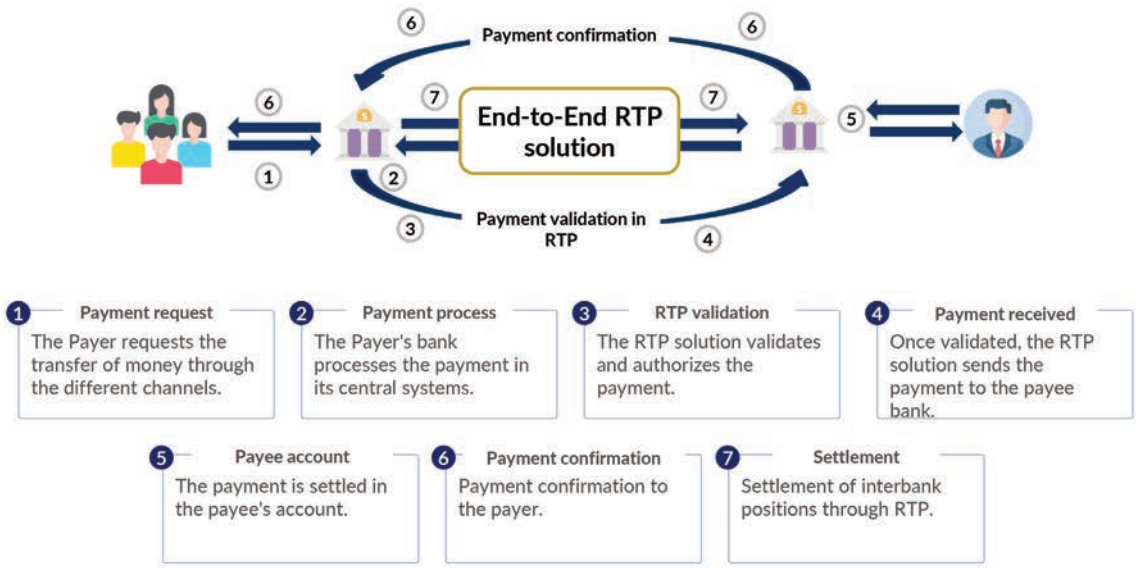
- Liquidity management: It is essential to ensure the immediate availability of funds in clearing houses and correspondent banks, while avoiding both excessive liquidity immobilization and overdraft costs.

- Irrevocability: RTP transactions cannot be reversed; any disputes must be handled through coordination between the involved entities and, if necessary, by initiating a new reverse transaction.

Therefore, it is essential to update the control frameworks of payment service providers, transitioning from preventive control models to proactive control schemes (see figure 13).

[36]https://www.europeanpaymentscouncil.eu/what-we-do/epc-payment-schemes/one-leg-out-instant-credit-transfer.
[37]About the FedNow Service (frbservices.org).
[38]Pix Statistics.

Figure 13. RTP process schematic.



Decentralization of financial services enables more agile, programmable and transparent structures

The term DeFi, short for "Decentralized Finance," refers to an ecosystem of financial applications built on blockchain infrastructures that operate without traditional intermediaries such as banks, brokers or centralized payment platforms. Instead of relying on centralized financial institutions, DeFi services are managed through smart contracts – automated programs capable of executing agreements according to agreed terms, without the need for third-party intervention.

Among the main examples of DeFi services, the following can be highlighted:

- Decentralized loans and credits: users can apply for or grant cryptocurrency loans without the intermediation of traditional financial institutions.
- Decentralized exchanges (DEX): platforms that allow the direct exchange of cryptocurrencies between users, eliminating the need for a central agent.
- Yield farming: strategy by which users contribute liquidity to DeFi protocols in exchange for rewards, optimizing the performance of their digital assets.
- Staking: the process of holding funds in cryptocurrency wallets to support the security and operability of blockchain networks, earning periodic rewards in exchange.

An attractive payments ecosystem with growth potential

As noted above, digitalization and the rise of e-commerce, along with advances in online banking and mobile applications, have facilitated the transition from physical to digital payment services.

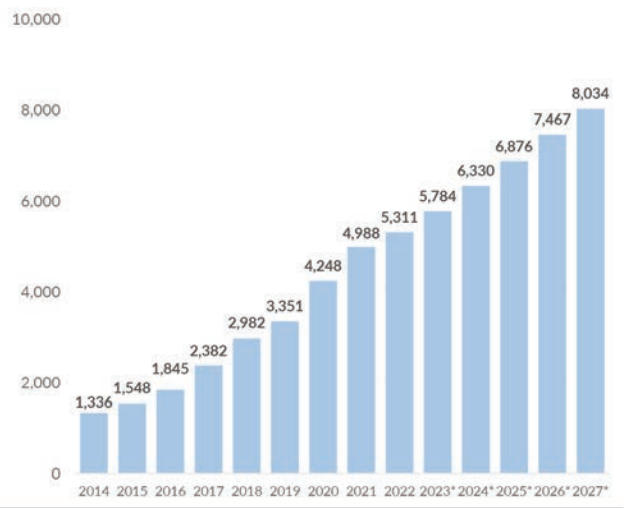
Considering the correlation between the growth of the e-commerce market and the digital payment services market – and given that global e-commerce sales reached $5.7 trillion in 2022, with forecasts projecting over $7.4 trillion in 2026 and $8 trillion in 2027, according to Statista data (see Figure 14) – the growth potential of the payment services market, and thus its attractiveness, is very high.

The attractiveness of the digital payments market is supported not only by its global growth but also by its expansion across different geographies and modalities. According to data from Worldpay (a subsidiary of Global Payments, a leading payments technology company headquartered in Atlanta, USA)[39]:

- It is estimated that digital payments will account for 74% of total transaction value by 2027, up 11% from 2023, with an estimated compound annual growth rate (CAGR) of 15% through 2027.
- At the same time, the value of e-commerce transactions paid through credit and debit cards is expected to decrease by 12% by 2027.

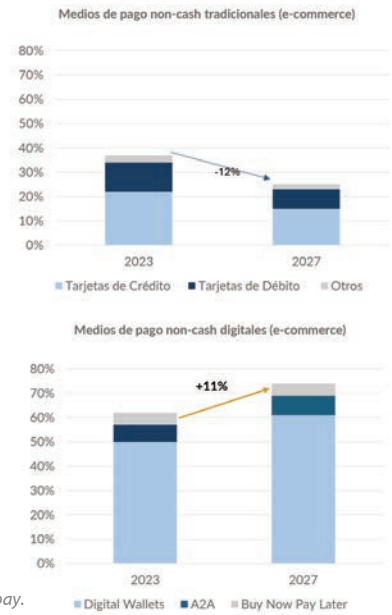
[39]Worldpay (2024). GPR 2024 9TH Edition: TheGlobalPaymentsReport2024.pdf.

Figure 14. Revenue from global e-commerce sales between 2014 and 2027 (in billions of dollars).



Source: Statista on data from eMarketer.

Figure 15. Forecasts of digital vs. traditional (non-cash) usage worldwide.



Source: Worldpay.

Challenges faced by the payments ecosystem participants

"Banks that understand technology will survive. Those that don't will disappear."

A paraphrase of Chris Skinner - British author, speaker and consultant, recognized as one of the world's leading experts on digital transformation in financial services, banking, financial technology (fintech) and the future of money - in his book Digital Bank (2014).

The payments ecosystem is undergoing a significant transformation, driven by digitalization, technological evolution and changing consumer demands. This transformation presents significant challenges for financial and non-financial institutions. In this context, it is crucial for organizations to understand and adapt to these changes in order to remain competitive and take advantage of new business opportunities.

Scale matters

In the payments arena, scale is a crucial factor, but not the only determinant of financial success. The ability to handle a large volume of transactions is essential for any entity wishing to compete efficiently.

However, the payments business is not sustained exclusively by the fees generated per transaction, since these tend to decrease progressively and, in some models, are not sufficient to guarantee long-term profitability or to finance the necessary technological investments. The real importance of scale lies in its ability to act as an enabler of more lucrative complementary services. A large customer base and a high volume of transactions allow a significant amount of data to be collected, which can be leveraged to offer additional financial products such as credit, insurance, investments and personalized services.

In addition, scale makes it possible to negotiate better rates with suppliers and reduce operating costs through economies of scale. This not only improves efficiency, but also makes it possible to offer more competitive prices, thus attracting more customers and further strengthening growth. This phenomenon has been one of the keys to the success of companies such as Alipay, whose business model is based on optimizing the mass processing of transactions to improve the parent group's overall margin.

On the other hand, having a large scale facilitates innovation, as it enables faster and lower-risk testing and deployment of new products – such as real-time payment solutions, integrated payments, or invisible payments, ultimately enhancing customer experience and loyalty.

In short, although payment processing – even on a large scale – does not guarantee high profitability on its own, its absence can represent a competitive disadvantage. Therefore, players within the ecosystem strive to become leaders in payment processing, aiming for it to act as a catalyst to strengthen customer loyalty and increase revenues through complementary services.

Intensive use of technology is not an option

In the area of payments, the intensive use of technology has ceased to be a strategic option and has become an indispensable condition for the competitiveness and sustainability of the players in the ecosystem.

Technology not only enables operational improvements, but also defines the ability of institutions to integrate interoperability networks, adopt advanced security standards and develop business models that are adaptable to an environment of constant innovation. Ignoring this reality means being left behind in an increasingly dynamic market, where efficiency, reliability and technological convenience determine the rules of competition.

Although the initial technological investments are high and their profitability may take time to materialize, organizations that want to reach or maintain a position of relevance in the payments ecosystem must focus on constant innovation – through, for example, the creation of innovation hubs – and face the high uncertainty inherent in such ventures (more common in fintechs than in traditional banking).

For traditional players, this technological challenge is twofold: not only do they have to be able to innovate, but also to achieve scalability while living with legacy infrastructures that make transformation difficult.

In addition to these facts, the technological evolution of the payments industry is dizzying, and innovative solutions tend to standardize quickly, which requires a deeply rooted organizational culture of change, capable of pivoting according to new trends and adapting in an agile manner. Unlike fintechs and bigtechs, traditional financial institutions often lack this culture of rapid transformation, which puts them at a competitive disadvantage.

New forms of financial crime

The emergence of new payment methods and business models also introduces new inherent risks, particularly in relation with financial fraud and money laundering. This new landscape makes it necessary to update risk mitigation strategies.

How changes in Payment Services are reflecting in Financial Fraud

The implementation of more agile payment systems has led to new forms of financial fraud, including the so-called Authorized Push Payment (APP) fraud, where criminals manipulate victims through social engineering techniques to induce transfers to fraudulent accounts.

According to the report "Real-time Payments and APP Fraud Emerging Globally," published in May 2023 by Aite-Novarica Group[40], which focuses on fraud trends in real-time payment (RTP) and authorized push payment (APP) - based on surveys of fraud executives from financial institutions in Brazil, Canada, India, the UK and the US:

- 71% of financial institutions reported an increase in account takeover (ATO) via real-time payment (RTP) channels between 2021 and 2022.
- 62% observed an increase in authorized push payment (APP) fraud over the same period.
- 57% indicated an increase in mule account activity on RTP channels.

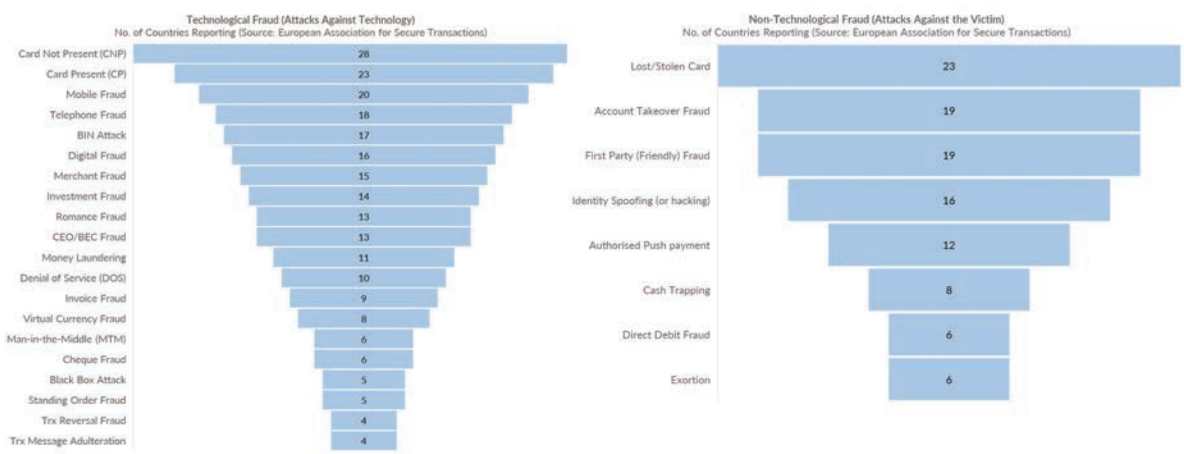
But "innovation" in financial fraud is not only occurring in RTP channels. Recently, fraudsters have also turned their attention to digital wallets and cryptocurrencies. According to Sift's report[41], fraud attempts in professional transactions increased by 66 % and digital wallet fraud by 33 % in 2020. Likewise, fraud in cryptocurrency transactions grew by 4.6%.

According to the European Association for Secure Transactions[42] (EAST), the most frequent frauds are card-not-present (CNP) transactions, followed by physical card fraud and mobile fraud (see Figure 16).

The Banco de España has reported that fraud claims rose from 911 in 2019 to 10,361 in 2022, increasing 11-fold in four years[43] (see Figure 16).

[40] Aite-Novarica: Faster Payments, Faster Fraud - Outseer™.
[41] Fraud picks up as the economy goes digital during the pandemic, studies find | Payments Dive.
[42] EAST publishes Fraud Update (association-secure-transactions.eu).
[43] Bank of Spain: Claims Report 2022 (Memoria de Reclamaciones 2022).

Figure 16. Types of fraud reported by entities participating in the study.



To date in 2023 the EAST Expert Group on All Terminal Fraud (EGAF) has published five related Fraud Alert

To date in 2023 the EAST Expert Group on Payment and Transaction Fraud (EPTF) has published one related Payment Alert.

Source: European Association for Secure Transactions.

Developments in fraud prevention methods

In the evolution of fraud prevention methods, the implementation of Strong Customer Authentication (SCA)[44] stands out. In this context, the European Central Bank (ECB) and the European Banking Authority (EBA) published a joint report in August 2024[45] analyzing payment fraud data within the EU. The report highlights the following:

- The total value of fraud was €4.3 billion in 2022, decreasing to €2 billion in the first half of 2023, thanks to the effective implementation of SCA under PSD2. Transactions authenticated with SCA showed significantly lower fraud rates, especially in card payments.

- The majority of card fraud (71% of total value in the first half of 2023) involved cross-border transactions, where the application of SCA is not mandatory.

Money laundering

Money laundering is one of the main threats facing the financial sector in its risk identification, management and control frameworks.

Innovations in payment methods – especially those aimed at offering financial services to people excluded from the conventional banking system, such as prepaid cards and the use of cryptocurrencies, have created opportunities in relation to money laundering, both for organized crime and terrorist groups, favored by anonymity and the poor application of due diligence controls by certain providers.

Combatting and preventing money laundering requires a certain level of sophistication, depending on the payment method used:

- **Prepaid cards**[46]. The detection of suspicious money laundering activity involving prepaid cards requires the modeling of behaviors that are not typically included in traditional detection scenarios, for example:

  - Customers who buy a lot of prepaid cards or who make a lot of transactions with this type of card.

  - Frequent loading of prepaid cards, as well as their use only for cash withdrawals.

  - Loading funds above the threshold.

  - Transfer of funds shortly after loading.

  - Customer who, in response to the notification of the obligation to report, is reluctant or not diligent in providing the required information.

  - Transactions occurring simultaneously in several states or countries outside the cardholder's area of residence.

  To minimize the growing risk of prepaid cards being used for money laundering, the European Union has tightened regulations through the Fifth Anti-Money Laundering Directive (5AMLD), which includes a reduction in the transaction limit for prepaid cards[47].

- **Cryptocurrencies**. Until recently, the lack of regulation has been one of the main enablers of money laundering through the use of cryptocurrencies. However, initiatives such as the Transfer of Funds Regulation (TFR) or the MiCA regulation developed in Europe are reinforcing control measures by imposing transparency and registration requirements on both issuers and service providers in the cryptocurrency market.

The Know Your Customer (KYC) process remains the first line of defense against money laundering. In light of the rise in high-profile cases involving globally systemically important banks, KYC has become one of the financial crime prevention activities that has attracted the most investment in recent years. This includes the adoption of technologies such as automated document verification, identity verification, politically exposed personnel (PEP) screening and biometric face analysis.

[44] Strong Customer Authentication | Visa.

[45] https://www.ecb.europa.eu/press/intro/publications/pdf/ecb.ebaecb202408.en.pdf

[46] The Essential Guide To Money Laundering With Prepaid Cards (financialcrimeacademy.org).

[47] Directive (EU) 2018/843, known as the Fifth Anti-Money Laundering Directive, introduced significant amendments regarding anonymous prepaid cards. Specifically, it lowered the threshold for mandatory identification of card holders from €250 to €150. In addition, it established a limit of €50 for remote or online transactions conducted with anonymous prepaid cards (https://eur-lex.europa.eu/ES/legal-content/summary/preventing-abuse-of-the-financial-system-for-money-laundering-and-terrorism-purposes-until-2027).

Opportunities for the participants in the payments ecosystem

"The future of payments is not cash; it's not cards; it's invisibility."
A paraphrase of the ideas of Dan Schulman, CEO of PayPal (2015–2024).

As discussed throughout this document, the payments ecosystem is undergoing a profound transformation that presents not only challenges but also a wide range of opportunities for both traditional and emerging players.

The convergence of technological innovation, proactive regulation and financial inclusion is creating favorable conditions for the development of new business models, more accessible payment solutions and enhanced user experiences. Traditional players can seize opportunities by reaching new customer segments, innovating products, monetizing data, exploring niche markets, or even issuing proprietary digital currencies. Emerging players, meanwhile, may enter the ecosystem either to replace incumbents or to provide specialized technological services that support others in the value chain.

This dynamic fosters not only greater operational efficiency, but also contributes to building a payments ecosystem that is increasingly interoperable, resilient, and user-centric.

Traditional stakeholders

Although the evolution of the payments ecosystem might be seen as a threat to traditional players who have led the sector for centuries, it also presents significant opportunities – provided they commit to deep transformation of their processes and systems.

Potential access to new customer segments

The sustained growth in global payments volume has driven increased sophistication on both the supply and demand sides. While services have become more standardized and tailored to meet evolving customer needs, users have also shifted their perception of payments – from a final stage to a strategic core of transaction and liquidity management.

However, not all customers have the same level of adoption of these new trends, nor do banks have adequate channels to reach all segments.

If we view customer segmentation in the payments ecosystem as a normal distribution, financial institutions are focusing on improving their ability to serve the outer ends of that curve, and are encountering challenges at both ends: At one end are sophisticated customers whose demands exceed conventional offerings; at the other, small businesses, particularly SMEs, that compete on priority of attention.

Two lines of action are emerging to address these challenges:

- Measures to close the supply gap: strengthening omni-channel capabilities (host-to-host connections, open platforms) and integrating complementary services such as currency hedging, large-volume payments and supply chain visibility.

- Measures to fill the demand gap: leveraging marketplace platforms to capture SMEs and other underserved segments through a more competitive and accessible offer.

Potential for innovation in new products and services

The current context offers traditional banks an opportunity to innovate in several areas:

- **Cryptocurrencies**: Custody services, exchange (purchase, sale and transfer), payments, loans, investments, cross-border payment solutions, specialized insurance, or cash pooling and cross border cash pooling solutions based on atomic settlement[48].

- ***Banking as a Service*** **(BaaS)**: monetization of banking infrastructure by providing services to third parties, such as fintechs or non-financial companies that do not have the capacity, possibility and/or interest in developing their own banking infrastructure, under API-ified models. BBVA Open Platform, Solarisbank, N5 Now or Ohpe are relevant cases that have made banking as a service a profitable business model by including in their catalogs B2B services such as:

    - **Regulatory compliance services** to fintechs and other companies that wish to operate in the financial sector and become regulated entities but do not have the know-how or structure to do so. This includes managing compliance requirements, monitoring transactions and ensuring that all operations comply with current regulations.

    - **Data monetization:** Exploiting the data generated through your BaaS platforms to deliver personalized services and improve the customer experience. This includes data analysis to identify behavioral patterns, provide personalized recommendations and optimize risk management.

[48]The process by which a transaction (or series of related transactions) is completed in its entirety or not at all. It is an "all or nothing" principle. In the context of cryptocurrencies and blockchain, it means that assets change hands instantaneously and synchronously, eliminating risks such as counterparty risk (the possibility that one party does not fulfill its side of the deal) or failed settlement risk (when a payment is made but the corresponding asset is not delivered, or vice versa).

- **Regulated market access services:** Provision of intermediation services for companies that do not wish to become regulated entities and prefer to use a third party as an intermediary. This includes account management, transaction facilitation and the provision of white label financial services under a secure and reliable regulatory framework.

- **Emerging markets (Web 3.0)**[49]: Development of solutions tailored to virtual reality, the metaverse and decentralized economies, offering products such as Web 3.0 wallets, token-based loyalty programs, payment services for virtual environments and decentralized digital identity (DID) solutions.

  The global Web 3.0 market reached a value of $3.2 billion in 2021 and is projected to reach $81.5 billion by 2030, with a compound annual growth rate of 43.7%[50]. This new world represents a significant challenge for financial institutions as it is based on a fully decentralized model that renders current services obsolete and demands new services.

Potential increase in revenues from monetization of the data

Data mining has become a fundamental strategy for financial institutions today:

- **Personalization of services** through the analysis of behavioral patterns from transactional data. For example, financial product recommendations can be developed based on customers' spending and savings habits, increasing the relevance and effectiveness of offers.

- **Development of new financial products** by anticipating emerging customer needs. For example, identifying segments that are not offered traditional financing or lack credit cards but actively use Buy Now, Pay Later (BNPL) services.

- **Optimization of risk management** using predictive models that detect behavioral patterns signaling potential payment defaults.

- **Operational efficiency** through automation processes based on Artificial Intelligence.

- **Generation of new sources of revenue** by commercializing anonymized, aggregated data and offering financial intelligence services.

[49] Web 3.0 is considered the third generation of the Internet´s evolution, characterized by decentralized data architecture (Filippi & Wright, 2018) , the semantic capability to understand and interpret content contextually (Berners-Lee et al., 2001), and the intensive use of emerging technologies such as blockchain, artificial intelligence (AI) and smart contracts (Al-Khalil et al., 2020) , in order to create a more interoperable, secure, transparent and user-centric network.

[50] https://www.emergenresearch.com/

Use of niche companies as accelerators of transformation

Traditional institutions can leverage new specialized providers, such as Paytech[51], to accelerate the implementation of cutting-edge solutions, minimizing internal development and integration costs while enhancing the user experience.

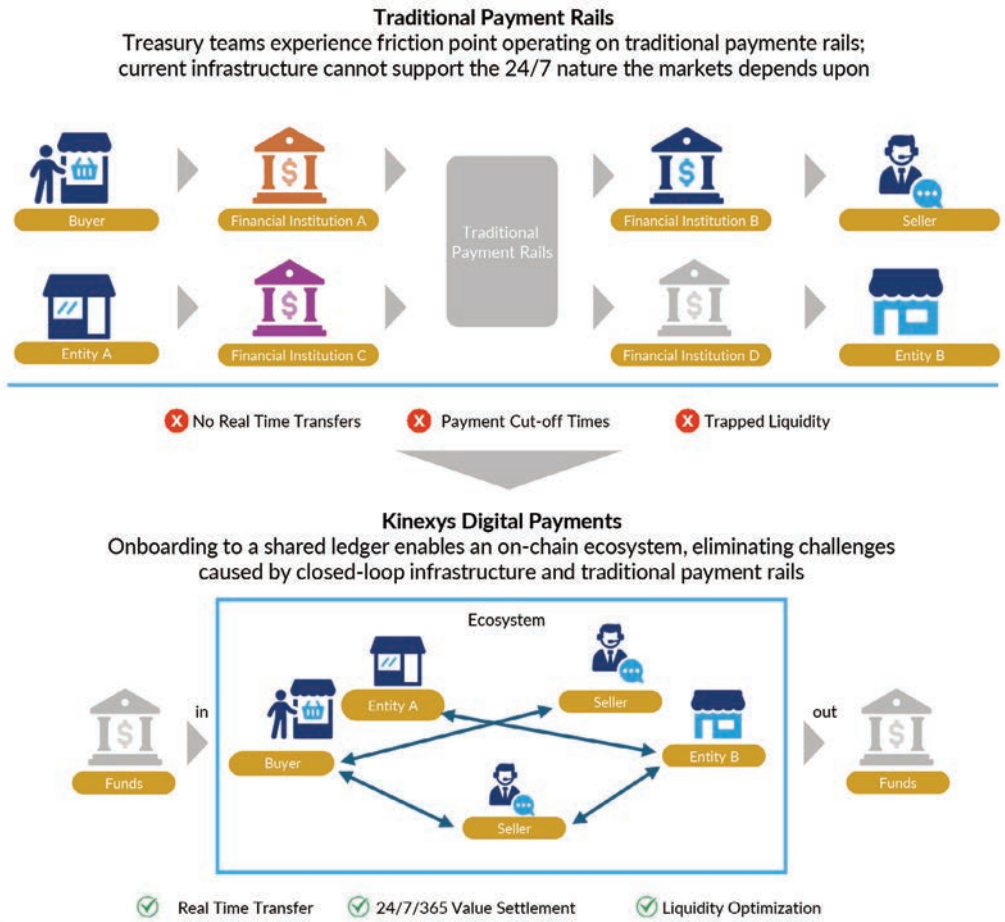
Potential for issuance of own currency

The possibility for financial institutions to issue digital currencies opens new horizons:

- **Proprietary currencies**, such as JPM Coin/Kynexis, a cryptocurrency issued by J. P. Morgan for interbank settlements, cross-border payments and corporate treasury optimization[52]:
  - Designed for use by institutional clients only, with 1:1 backing in USD (each Kynexys represents one US dollar on deposit at JPMorgan).
  - It eliminates traditional treasury friction points and enables real-time liquidity management through cross-border payments beyond currency cut-off times, holidays or weekends[53] by operating according to a scheme such as the one described in Figure 17.
- **Stablecoins:** Banks can issue regulated stablecoins, creating digital versions of deposits or e-money tokens whose settlement times and costs, compared to traditional systems such as SWIFT, are significantly lower.
- **Tokenization of assets** (stocks, bonds, real estate) that can be traded on blockchain.
- **New digital financial services** (wallets, programmable payments, blockchain-based smart credits) as well as services related to the roles defined for financial entities in monetary regions that have issued public digital currencies (CBDCs) such as the Digital Euro.

[51] AEFI_Libro-Blanco-PayTech-2020_Diciembre-2020.pdf (asociacionfintech.es).
[52] According to data from J. P. Morgan (https://www.jpmorgan.com/kinexys/index), Kynexis, in its 4 years of operation, has accumulated a transaction volume in excess of $1.5 trillion with an average transaction volume per day in excess of $2 billion.
[53] J.P. Morgan– Kynexys Digital Payments (https://developer.payments.jpmorgan.com/docs/treasury/global-payments/capabilities/global-payments-2/jpm-coin-system/index).

Figure 17. Comparison between payment through traditional rails and payment through a digital currency issued by a commercial bank.



Fuente: J. P. Morgan

Emerging Actors

Likewise, emerging players - such as fintechs, technology startups, digital platforms and projects based on decentralized technologies - find opportunities to access the ecosystem either by replacing traditional intermediaries with more agile, user-centric solutions aligned with contemporary digital demands, or by replicating Marketplace models of financial services under the Banking as a Platform philosophy.

Potential for replacing traditional intermediaries

New players are revolutionizing the ecosystem with highly competitive value propositions through diverse business models, including:

- Becoming Payment Service Providers by offering specialized payment services (including integrated solutions and value-added services).
- Designing and commercializing Open Banking solutions.
- Launching paid services on Web 3.0 through NFTs.
- Offering DeFi (decentralized finance) solutions.

Establishing their own entities classified as "Payment Service Providers," offering various types of solutions:

- Solutions for integrating different payment methods under standardized APIs, designed for fully digital processes with:
  - Instant approval.
  - Flexible contracting models, without long-term commitments, cancellation fees, or permanence requirements.
  - Low or no monthly fees, avoiding the high charges typical of traditional merchant account providers.
  - Flat processing fees, with no additional charges for card types, PCI compliance or paper statements.
  - Simplified sales and business management tools, combining payment services with features such as point-of-sale (POS) systems, online stores, and electronic invoicing.
- Embedded value-added services: Fraud protection, compliance consulting, multilingual and multicurrency processing.

The digital euro

What is the digital euro?

The digital euro is a digital currency (CBDCs) that will be issued and backed by the European Central Bank (ECB) mirroring the traditional euro. Consequently, it is considered a liability of the Central Bank, rather than of a commercial bank.

Why do we need the digital euro?

One of the main arguments put forward by the ECB for the launch of the digital euro lies in the absence of a European digital payment option covering the entire Euro Area. Currently, 13 of the 20 member countries rely on international payment schemes - managed mainly by U.S. companies such as Visa and Mastercard - for card transactions. The digital euro is presented as a European electronic means of payment, accessible and accepted in all eurozone countries.

However, one of the most prominent fears is that the digital euro could facilitate excessive surveillance of citizens' financial transactions, thus compromising their privacy. Unlike cash, which allows anonymous transactions, the digital euro could leave a digital trail of every transaction. The ECB has acknowledged this concern in its report on the digital euro, noting that "privacy is the most important aspect of a digital euro for both individuals and professionals." However, various critics warn that, even if measures are implemented to protect privacy, the very design of the digital euro could make it easier for authorities to track transactions.

How is the digital euro regulated?

The digital euro falls outside the scope of both the Cryptoasset Markets Regulation (MiCA) and the DLT/MiFID II framework. For this reason, on June 28, 2023, the European Commission presented a dedicated legal framework for its potential introduction, as part of its broader “Single Currency Package“. The preparation phase of the project started in November 2023 and, as by December 2024, the second progress report[1] was published. This report anticipated a decision on whether to move to the next phase of the project by late 2025. In any case, the ECB´s Governing Council will not make a final decision on issuing the digital euro until the relevant legislation has been adopted.

What stage are we at?

In October 2020[2] , the ECB published a report analyzing the potential issuance of a digital central bank currency for the Eurozone. Nine months later, the ECB Governing Council decided to launch the digital euro project. The research phase, which ran from October 2021 to October 2023, explored a range of design options and distribution models, in close collaboration with EU authorities and market participants. The findings from this phase provided the foundation for the decision to move forward with the preparation phase, which began in November 2023[3].

The current preparation phase focuses on laying the groundwork for the potential issuance of the digital euro, including the finalization of the scheme's operational rules and the selection of suppliers responsible for developing the required platform and infrastructure. The preparation phase includes numerous tests and experiments, as well as regular exchanges with the public and other stakeholders, in order to ensure that the digital euro meets both the needs of users and the requirements of the Eurosystem. This phase is expected to be completed in the fourth quarter of 2025 (see Figure 18).

What role distribution is foreseen?

There are concerns that the digital euro could lead to a disintermediation of the traditional banking system. Should citizens decide to hold their funds directly in digital euros with the ECB, commercial banks could face a significant reduction in deposits, affecting their ability to lend.

The ECB has pointed out that "the digital euro should be designed taking into account the possible unintended consequences of its issuance, in order to limit its possible adverse effects on monetary policy and financial stability". To this end, a distribution of roles and functions between the Eurosystem and supervised intermediaries has been envisaged so that:

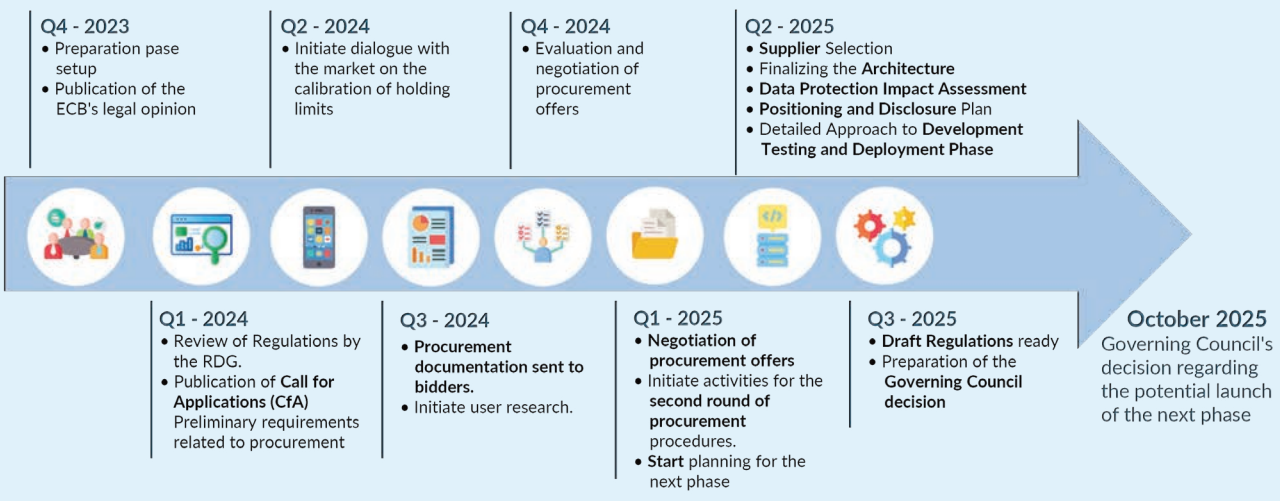
- The Eurosystem is responsible for issuing currency and ensuring adequate liquidity in the system, managing the entities under supervision and providing settlement services.
- Intermediaries are responsible for managing accounts and digital wallets, providing the devices that enable the management of payment instruments, performing initiation, authentication, validation and post-settlement services associated with transactions, and providing services related to the funding and withdrawal of funds between accounts and wallets.

In the context of digital euro distribution, financial intermediaries will need to evolve if they wish to remain relevant players within the Eurozone's payments ecosystem, by offering services such as:

- Providing a front-end portal for customers and implementing a Know Your Customer (KYC) protocol.
- Supplying devices and interfaces that support digital euro payments, as well as account opening services, digital wallets, onboarding and offboarding processes.
- Enabling the financing and defunding of customers´ digital wallets 24 hours a day, 365 days a year.
- Initiating, authenticating, validating and executing post-settlement activities such as transaction reconciliation.
- Offering application programming interfaces (APIs) in compliance with the PSD2 Directive, allowing third parties to access and develop value-added services.

[1]https://www.ecb.europa.eu/press/pr/date/2024/html/ecb.pr241202~d0b19e5e1b.en.html.
[2]https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf.
[3]https://www.ecb.europa.eu/press/pr/date/2023/html/ecb.pr231018~111a014ae7.en.html.

Figure 18. Digital euro project schedule.



Source: European Central Bank.

Design and commercialization of Open Banking solutions

- Account aggregation Financial information aggregators access their clients' payment accounts across various financial institutions, allowing clients to view their entire financial position from a single access point. This basic service can be enhanced to offer higher value-added solutions, such as advanced personal financial management tools or treasury management systems for SMEs.

- Payment initiation: This service involves issuing a payment order directly from a customer's bank account to a merchant's account, enabling Account-to-Account payments without relying on credit or debit card intermediaries.

- Development of scoring/debt advise models: By accessing clients' financial information from multiple institutions, aggregators can build scoring models to evaluate the financial capacity of loan applicants. These services can also provide debt counseling, assessing optimal debt levels or refinancing options.

- Overdraft coverage: Combining account aggregation and payment initiation, these services monitor payment account transactions and automatically initiate transfers from another account of the customer to prevent overdrafts through instant fund transfers.

Launch of Web 3.0 payment services via NFTs

Within virtual ecosystems such as the metaverse, buy/sell transactions are conducted using wallets where NFTs – Non-Fungible Tokens – are traded. NFTs are unique digital assets that represent ownership of a specific item and cannot be exchanged for other tokens of equal value. These assets, whether digital or physical, are registered on a blockchain.

Currently, many regulations restrict financial entities from providing custody or services related to these digital assets, creating opportunities for non-financial entities to fill this gap.

Although most common uses of NFTs today lie outside the traditional payments ecosystem – such as digital art, collectibles, virtual real estate, music, media, and gaming – these new asset types within virtual ecosystems mark a key development within Web 3.0. This represents the next evolution of e-commerce, where customers no longer expect to receive a physical object or service but rather an NFT instantly, introducing a novel concept of "currency" and ownership.

Adapting payment platforms to process NFTs opens up new business opportunities, including:

- **Offering a stablecoin gateway:** Allows end users to pay with fiat money while converting the value into an equivalent amount for the NFT issuer.

- **Metaverse experiences:** Facilitating payments for virtual experiences within the metaverse, similar to how traditional e-commerce handles physical goods today.

- **Financing / subsidizing projects:** Using NFTs without direct monetary value as symbols of solidarity or sustainability, such as awarding NFTs to participants in recycling campaigns as proof of contribution.

- **Interoperability:** Enabling seamless transfer of NFTs and other digital assets between different metaverse platforms.

Leverage in DEFI solutions (decentralized finance)

In the context of cryptocurrencies and blockchain technology, "DeFi" stands for "Decentralized Finance".

The term DeFi refers to an ecosystem of financial applications built on blockchain infrastructures that operate without traditional intermediaries such as banks, brokers or centralized payment platforms. Instead of relying on centralized financial institutions, DeFi services are managed through smart contracts, which are automated programs capable of executing agreements according to agreed terms, without third-party intervention.

Although the maturity level of these services is still low, DeFi opens up new business opportunities, including:

- Connecting the decentralized environment with traditional payment channels through DApps integration, enabling seamless interaction between both financial worlds.
- Offering liquidity in fiat currency (FIAT) within DeFi services in an integrated and accessible manner, simplifying the overall user experience.

Main examples of DeFi services:

- **Decentralized loans and credits:** Users can apply for or grant cryptocurrency loans without the intermediation of traditional financial institutions.
- **Decentralized Exchanges (DEX):** Platforms that allow the direct exchange of cryptocurrencies between users, eliminating the need for a central agent.
- **Yield farming:** A strategy whereby users contribute liquidity to DeFi protocols in exchange for rewards, thereby optimizing the performance of their digital assets.
- **Staking:** The process of holding funds in cryptocurrency wallets to support the security and operability of blockchain networks, earning periodic rewards in exchange.

There are many benefits that users of the DeFi ecosystem recognize: easier access to financial services, cost reduction, increased competition, improved operational resilience, enhanced transparency, and avoidance of arbitrary government interference. However, we must not forget that the associated risks are significant[54]:

- Operational risks that arise from the recombination of ecosystem components to create value, leading to increased interconnections and, consequently, greater complexity - making incidents more likely (e.g., cyberattacks, performance limitations, operational congestion, etc.)
- Financial risks that are mainly related to conflicts of interest, the possibility of price manipulation, and excessive leverage (the DeFi system relies on automated mechanisms that can accelerate and amplify crises in short periods of time - these mechanized actions increase the price volatility of underlying assets, ultimately exacerbating naturally occurring tensions).
- Governance issues inherent to a decentralized system. It is not uncommon, for example, for a few agents to hold the majority of voting tokens, or for crucial decisions to be made by a small group (founders, developers, etc.) under the pretext of greater agility - without investors necessarily being aware of this situation. Additionally, decentralization makes it difficult to identify a valid point of contact to address complaints and claims.
- Dishonest conduct or, at the very least, actions misaligned with the interests of the clients.
- Propensity for market manipulation and fraud, whether through mechanisms aimed at deliberately altering the validation sequence of pending transactions, exploiting access to insider information to influence price movements, or falsifying activity volume to inflate market growth expectations and create speculative bubbles, among other risks.

[54] Economic Bulletin de Banco de España (https://www.bde.es/f/webbe/SES/Secciones/Publicaciones/InformesBoletinesRevistas/BoletinEconomico/23/T3/Fich/be2303-art04.pdf)

Regulation of the DeFi sector remains limited and evolving in most jurisdictions. The decentralized nature of these platforms and their constant innovation pose significant challenges for regulators, as many applications lack a centralized entity that can be directly supervised.

Potential for the creation of banking services platforms

Large technology companies are looking to replicate Market Places models for the financial sector, leveraging payment data to offer integrated financial services under the Banking as a Platform philosophy:

- The platform manager, who is not a financial institution, retains control over the customer relationship and therefore is not subject to the regulatory obligations typical of the financial industry.
- The financial entity acts as the service or product provider, with no direct interaction with the end customer, and assumes all operational and regulatory responsibilities involved in the "manufacturing" of the financial instrument.

Case study - Inclusion of new players in cross border transfers

This case study aims to show how the inclusion of new players in the payments ecosystem leads to more efficient processes and better economic outcomes for end consumers. To this end, a comparison will be made between two cross-border transfers involving accounts of a business group operating in three countries – Spain, Croatia and Colombia - under a traditional environment and a digital environment.

Based on the comparison, the following conclusions can be drawn:

- In a traditional environment, the two transfers take between 3 to 7 days (see Figure 19).
- In a digital environment, with "book to book" or virtual account-based solutions, the same transfers can be executed instantaneously or take a maximum of 2 days.

Conceptual response in a traditional environment

Since both Spain and Croatia belong to the SEPA Zone, daily transactions initiated from Spain will take a maximum of one day to become effective, and with the same cost as a standard transfer.

On the other hand, for transactions initiated from Croatia to Colombia, as these are international transfers, the time it will take for the transfer to become effective will vary between 3 and 7 days depending on whether the intervention of a single correspondent bank or several correspondent banks is required. (see figure 19).

Conceptual response in a virtual environment

A situation like the one described in the previous section is far from the target model that today's customers demand. Therefore, an institution aiming to be at the forefront of payment services would consider undergoing a transformation to convert its processes into those of a digital bank. This would enable the institution to deliver financial services through online platforms and mobile applications, allowing customers to carry out transactions, manage accounts, apply for loans, invest and perform other financial activities entirely over the Internet (see Figure 20). This model would significantly reduce transaction times and could even enable transactions to be completed instantaneously.

Common characteristics:

- Online operations.
- Absence of physical branches.
- Low or no operating costs.
- Access to a variety of financial services.
- Technological innovation.

Achieving value-added and differential service:

- Account opening in minutes.
- Instant access to accounts.
- Transfers with lower costs.
- Accessible banking with greater transparency.
- No opening or closing hours.

Undertaking a transformation process like the one described in this case study is not simple. However, the market reality is that there are emerging players with the ability to carry out international transfers, competing on both cost and processing time—at both the individual level (P2P or C2C) and the business level (B2B)—based on a virtual model. For illustrative purposes, some benchmark examples in this space include:

1. Revolut for Business.
2. TransferWise.
3. B2BPay.
4. Xoom (a Paypal service).

Figure 19. Schematic diagram of the process for an international transfer outside the SEPA zone through physical banks.

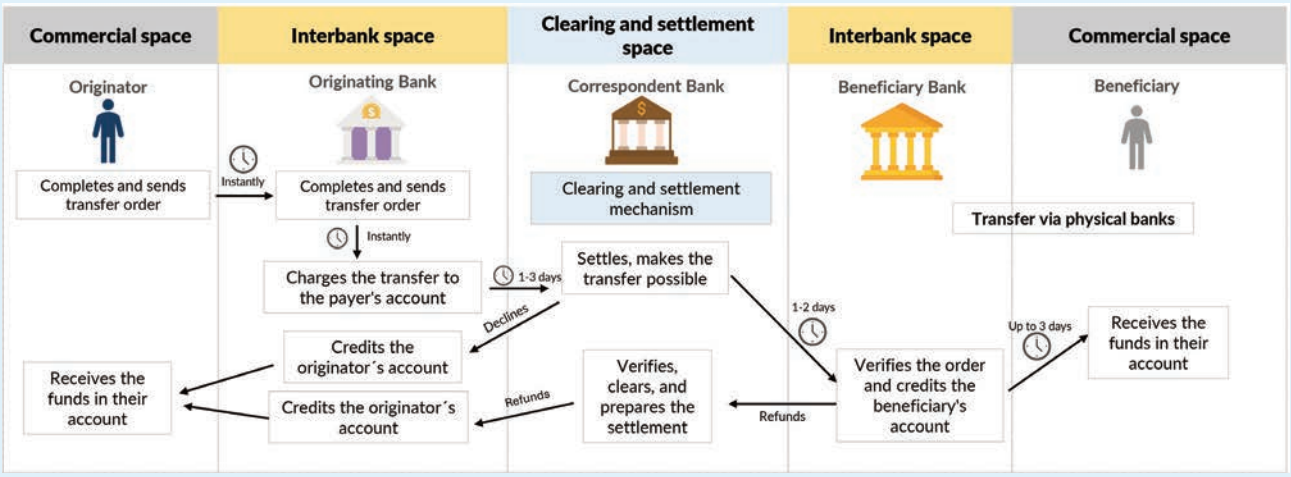
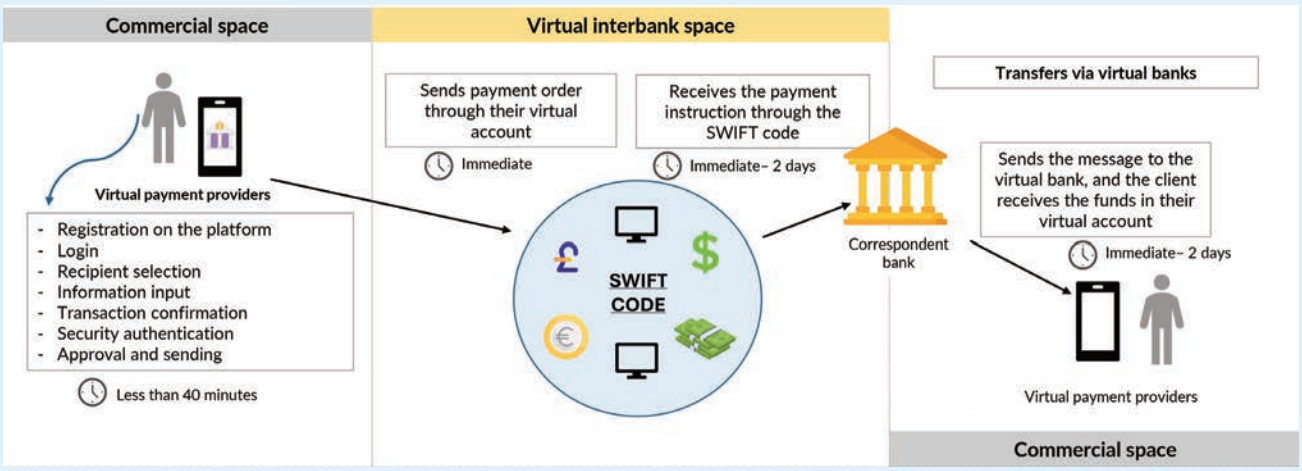


Figure 20. Schematic of the transfer process through virtual banks.



Conclusions

"Change is the law of life. And those who look only to the past or the present will miss the future."

John F. Kennedy

In the payments landscape, both today and in the future, constant innovation, openness to change, and adaptability are essential for seizing opportunities created by technological disruptions and shifts in consumer preferences. To stay at the forefront of the industry, both traditional and emerging players must undergo significant transformation.

There are many opportunities in this scenario for both traditional financial system players and new participants, who can explore business alternatives either by competing directly with financial institutions as payment service providers or by developing complementary services. Adapting to change means evolving towards a model where we are able to provide added value in a current environment characterized by:

- Digitalization where physical means of payment (cash, checks, physical cards) lose importance, though they don't disappear, in favor of digital payment methods.
- The coexistence of "tradition" and "innovation", both through seamless integration between traditional digital payment methods and emerging solutions, and growing competition between traditional players and new entrants.
- A strong trend towards interoperability, instantaneity and the decentralization of transactions.
- Intensive use of technology to offer customers faster, more flexible and more secure payment experiences.

In this context, only those players who can agilely transform towards digital models, adopt a global and holistic vision of both their processes and technological architectures, and while ensuring robust control models, will position themselves at the forefront of the payment services industry. They will be able to provide additional value to their customers and, ultimately, maintain their relevance within the payments ecosystem.

Glossary

Acquirers - Financial institutions that process card payments on behalf of merchants and facilitate the receipt of funds.

BaaS (Banking as a Service) - Model in which banks provide their infrastructure to third parties to offer financial services through APIs.

Digital banking - Financial services platform offered by banks through digital channels without the need for physical branches.

BNPL (Buy Now Pay Later) - Financing model that allows consumers to defer their payments in interest-free installments or with minimal costs.

CBDC (Central Bank Digital Currency) - Digital currency issued by a central bank as a complement to traditional cash.

Cryptocurrencies - Decentralized digital currencies that use cryptography to validate transactions and control the creation of new units.

DeFi (Decentralized Finance) - Ecosystem of financial applications built on blockchain that operate without the need for traditional intermediaries such as banks, brokers or centralized payment platforms.

payments ecosystem - A set of organizations that collaborate and compete in the production of payment services, innovating and creating value for users.

Issuers - Financial institutions that issue credit or debit cards to customers, managing their use and security.

PayFac (Payment Facilitators) - Companies that intermediate between acquirers and merchants, streamlining the integration and processing of payments.

Integrated finance - Integration of financial services in non-bank digital platforms, allowing users to access payments, credits and other services without leaving the platform.

Wallets / Digital wallets - Applications or platforms that store financial information and allow electronic payments without the need for a physical card.

Neobanks - Fully digital banks that offer financial services through mobile or online platforms without physical infrastructure.

NFC (Near Field Communication) technology - Technology that enables short-range communication between two wireless devices in a convenient and fast way.

NFTs (Non-Fungible Tokens) - Unique digital assets that represent ownership of a specific item, whether digital or physical, and are recorded on a blockchain

Open Banking - A model in which banks share customers' financial information with authorized third parties with the user's consent, fostering innovation in payments and financial services.

Real Time Payments / Instant Payments - Electronic transactions that allow the immediate availability of funds in the beneficiary's account, completing the process in seconds and available 24/7.

Invisible payments - Transactions that are carried out without active user intervention, using biometric recognition or automatic payments in applications.

Payment gateway - Platform that facilitates electronic transactions between buyers and merchants, ensuring secure data transmission.

PayTech - Fintech subsector focused on developing technologies and platforms to facilitate and improve payment processes.

Payment processors - Companies that manage the authorization, clearing and settlement of electronic transactions.

Paid services - A set of financial products that allow different agents to carry out financial transactions, manage their liquidity and mitigate risks.

Stablecoins - Cryptocurrencies whose value is linked to stable assets such as the dollar or euro to reduce volatility.

Tokenization - Process of replacing sensitive data with unique identifiers (tokens) to improve security in electronic transactions.

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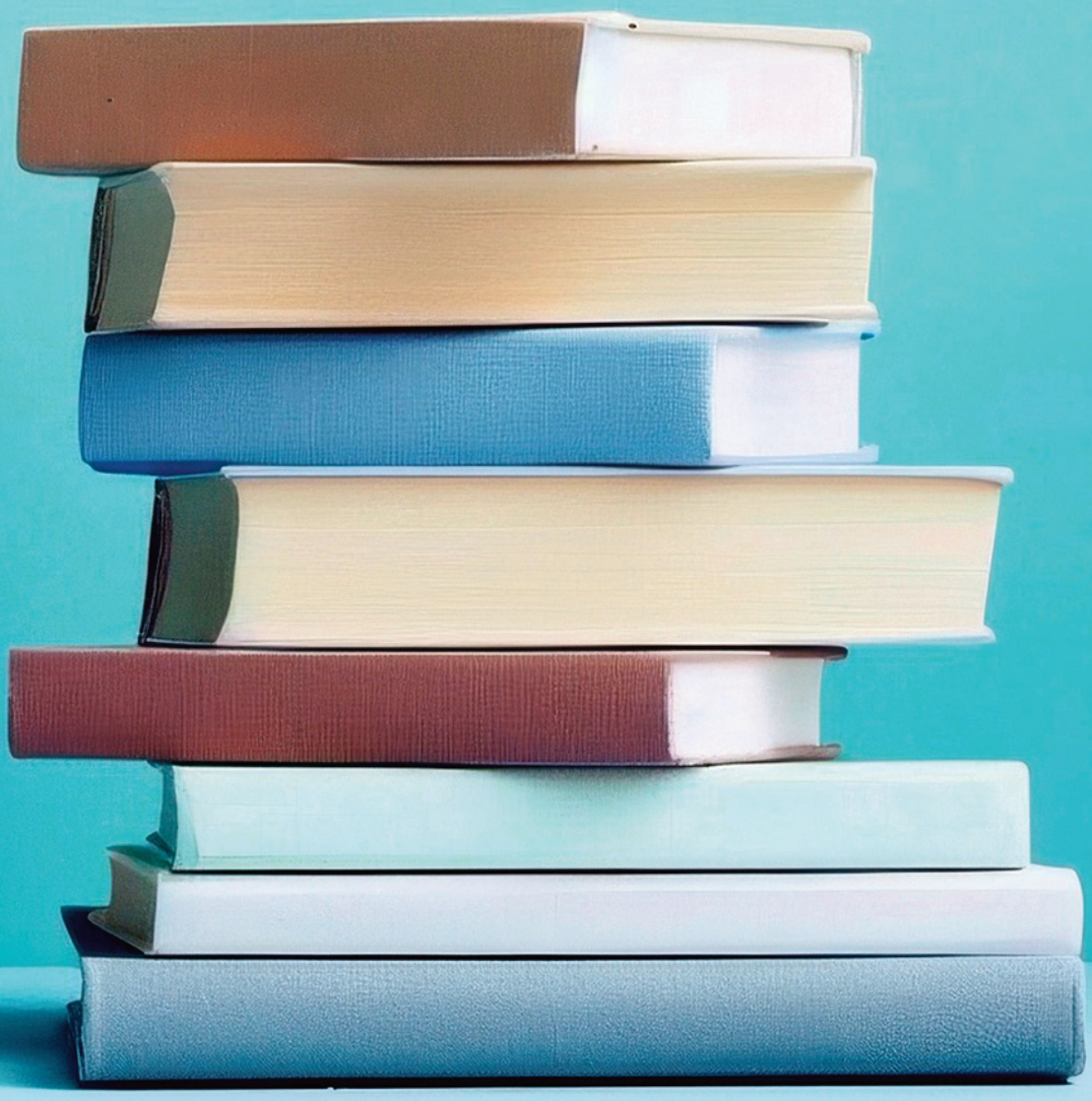

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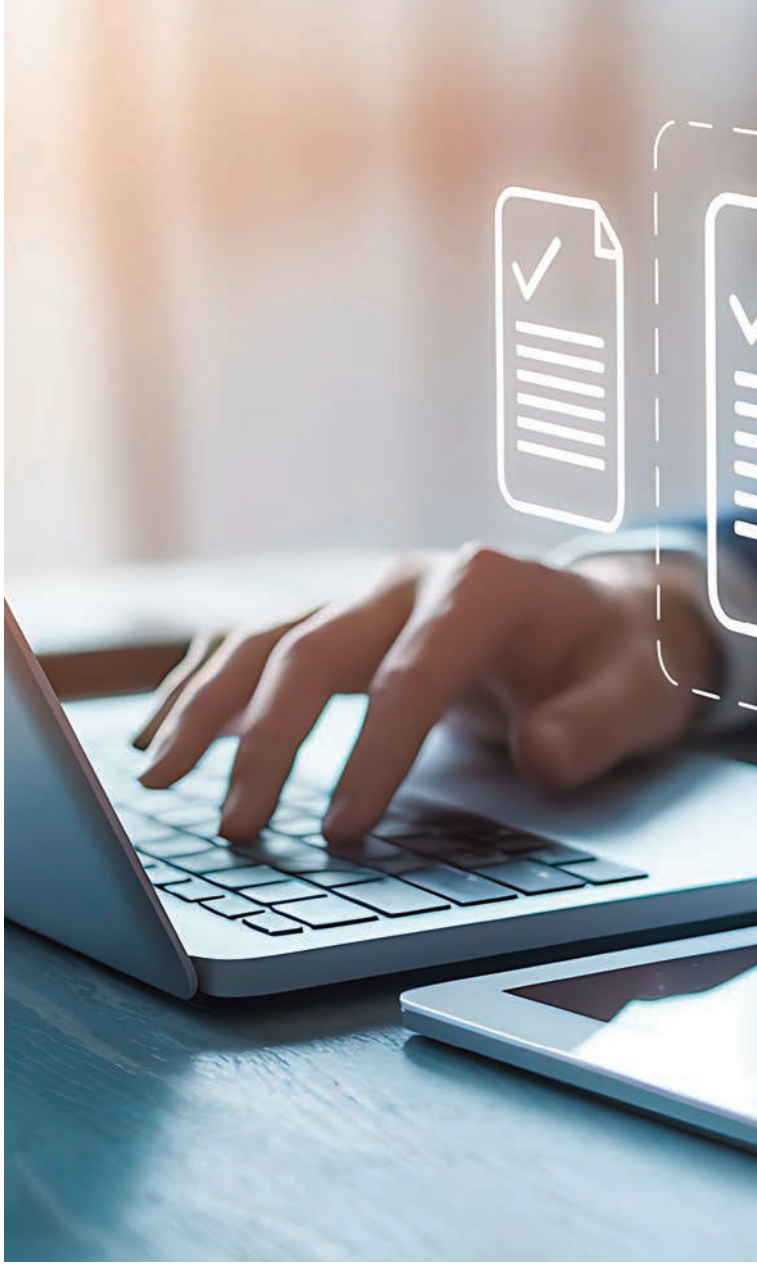

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