Smart financial services: AI's role in transforming fintech payment systems

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Abstract :
The rapid convergence between data science, artificial intelligence and the financial sector, has established financial technologies (FinTech) and, especially, digital payments as a cornerstone of the modern global e-commerce. However, despite the registered growth of (FinTech), Paytechs remain an under-researched domain within the academic literature. The present study, through an exploratory qualitative study, try to address this critical gap by synthesizing recent literature to evaluate the integration, key applications, success factors, and strategic perspectives of AI within the Paytech sector. The findings delineate the theoretical expansion of Paytech digitalization while providing actionable practical insights for managers and policymakers navigating the operational, security, and trust dynamics of AI adoption.

Mots clés:
Mot clé.1: Intelligence Artificielle (IA)
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Résumé :
La convergence rapide entre la science des données, l'intelligence artificielle et le secteur financier a placé les technologies financières (FinTech), et en particulier les paiements numériques, comme pierre angulaire du commerce électronique mondial contemporain. Toutefois, malgré la croissance enregistrée des FinTech, les PayTech demeurent un domaine encore peu exploré dans la littérature académique. La présente étude, menée selon une approche qualitative exploratoire, vise à combler ce vide critique en synthétisant les travaux récents afin d'évaluer l'intégration, les principales applications, les facteurs de succès et les perspectives stratégiques de l'IA dans le secteur des PayTech. Les résultats mettent en évidence l'expansion théorique de la digitalisation des PayTech tout en fournissant des recommandations pratiques aux gestionnaires et aux décideurs politiques confrontés aux dynamiques opérationnelles, sécuritaires et de confiance liées à l'adoption de l'IA.

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1. The introduction

In recent years, the field of finance has become increasingly intertwined with new-generation data science and artificial intelligence (DSAI) techniques (Cao, Yang, & Yu, 2021). FinTech; the abbreviation of Finance with Technology (Błach & Klimontowicz, 2021); occupies a central position within this convergence, driving the innovation, and the transformation of financial services (Cao et al., 2021).

While much of the existing literature concentrates on innovation more broadly and on the determinants shaping its adoption, including within payment systems specifically, research addressing PayTechs as a distinct category of FinTech entity (Błach & Klimontowicz, 2021; Polasik, Huterska, Iftikhar, & Mikula, 2020; Thakor, 2020) and their market activity remains a comparatively nascent field of inquiry (Błach & Klimontowicz, 2021; Yang, Mamun, Mohiuddin, Nawi, & Zainol, 2021). In several developing economies, such solutions function as a smart payment alternative capable of generating sustainable competitive advantage (Yang et al., 2021).

Digital payment services are reshaping conventional forms of payment worldwide owing to the substantial savings they afford in cost, time, and effort (Irimia-Diéguez, Albort-Morant, Oliver-Alfonso, & Ullah, 2024), a feature that lends them considerable significance not only in facilitating remittances but also in fostering the successful growth of electronic commerce globally (Tang, Chau, Hong, Ip, & Yan, 2021). Consequently, many leading e-commerce companies are investing heavily in the development of their payment infrastructure in order to attract users and remain competitive within the market (Tang et al., 2021).

Reflecting this momentum, the global digital payment industry is projected to reach approximately $361.3 billion by 2030, with 74% of consumers' payments will be processed through non-traditional providers by that same year (GDSLink, 2025).

1.1. Research importance

The interaction between artificial intelligence (AI) and PayTech (payment technologies) constitutes an emerging, high impact research domain at the intersection of finance, computer science, regulation and socio technical studies. It has emerged as a transformative force across various sectors(Douah & Bouhriz Daidj, 2025) of modern society, reshaping economic landscapes, social interactions, and ethical considerations(Marqeta, n. d.),and enhancing operational efficiency, customer service, and risk management across the industry(Barnatt-Smith, 2025) by presenting unprecedented opportunities and challenges(Hu & Downie, 2025).

1.2. Research gap

The current study seeks to address a significant gap in the research corpus on AI and PayTech services, as the interconnection between these two concepts has not yet received sufficient scholarly attention. This gap is particularly relevant given, on one hand, the expected growth of digital payment markets (N. Khan, Falahat, Ullah, Sikandar, & Van, 2025), and, on the other hand, the limited academic exploration of how AI can enhance efficiency, security, and consumer trust within PayTech ecosystems. Therefore, this study aims to highlight the interconnection between AI and PayTech by examining their points of convergence and by engaging with issues frequently raised in the literature on AI-services.

1.3. Research aims and objectives

The objective of this research is to ascertain the significance of AI in advancing the PayTech sector, which can be comprehensively explored through the study of AI and digital payment concepts and their interaction. Consequently, the study's results will allow us to reach a conclusion and suggest future research directions that will guide scholars, industry leaders, and policymakers in better understanding and leveraging the interconnection between AI applications and PayTechservices.

1.4. Research questions

This research aims to identify the link between the application of artificial intelligence and PayTech with a view to promote this attractive sector. In this regard, we ask the following questions (RQs):

RQ1.What arePayTechs?

RQ2.What arePayTechs' success factors?

RQ3. What are the key applications of AI in PayTech?

RQ4. What are the perspectives of the AI applications in the PayTech sector?

1.5. Methodology

This study explores the interaction between Artificial Intelligence (AI) and payment technologies (PayTechs) through an interpretivist lens. Rather than seeking generalizable scientific laws, it aims to produce meaningful insights into their interconnections. Using an inductive, exploratory qualitative approach based on recent academic literature, the research highlights key relationships between AI and PayTechs, with document selection guided by relevance, recency, and thematic alignment.

This research is structured as follows. Section 2 outlines the definitions and scope of AI and PayTech. Section 3 examines the evolution of PayTech services. Section 4 highlights the key success factors of PayTech, with particular attention to the challenges and opportunities shaping the sector. Section 5 discusses how challenges and issues in applying AI within the PayTech sector can be overcome and, at the same time, explores the future trajectory of PayTech in light of AI integration. Finally, Section 6 concludes the study by summarizing the main findings and offering recommendations for future research.

2. Definition and Scope

2.1. What is AI and what it is used for?

Artificial intelligence (AI) can be defined as digital and computational systems capableof perceiving and processing information from their environment, in order to learn, adapt, support, and autonomously adapt and perform tasks traditionally reserved for human judgment and expertise (Bendig & Bräunche, 2025; fodil & khanoussa, 2025; Ramaul, Ritala, Kostis, & Aaltonen, 2026).Functionally, such systems operate through a perceive–process–act cycle, and the algorithms underlying them can be grouped into descriptive, predictive, prescriptive, and generative approaches, each supporting different purposes within management and information systems contexts(Bendig & Bräunche, 2025).

2.1.1. AI benefits and applications

A. Key Benefits of AI

According to Bendig and Bräunche (2025) the benefits and potential of artificial intelligence (AI) span several core dimensions, ranging from decision-making optimization and unstructured data processing to efficiency gains in data labeling and real-time environment adaptation:

1. Descriptive, predictive and prescriptive Benefits:AI enables organizations to process historical data to uncover hidden patterns, forecast future events, and prescribe actionable recommendations to achieve a desired objective or outcome.

2. Processing unstructured data: unlike conventional analytical methods restricted primarily to structured numeric tables, modern AI allows researchers and practitioners to extract value from multi-modal unstructured data, including text, images, and audio signals.

3. Creating new content and use cases: in one hand, generative AI allows systems to generate original content rather than solely extracting knowledge from existing datasets, and in the other hand, it unlocks new creative applications across domains like product design and automated text generation.

4. Reducing data limitationscosts: a major hurdle in traditional machine learning is the requirement for massive, manually labeled datasets. AI techniques such as semi-supervised learning and reinforcement learning can solve these constraints and provide better results.

5. Operating in real-world environments with enhanced interpretability:AI algorithms equip systems to navigate dynamic, highly complex operational settings while explainable AI (xAI) improves trust and transparency by resolving "black-box" problems

B. AI applications

The AI applications can be organized around a common thread: AI moves from a supporting tool to an active participant in organizational processes, spanning conceptual rolesand concrete functional domains(Bendig & Bräunche, 2025; Ramaul et al., 2026) :

1. Decision-making &risk management: AI augments human judgment through predictive insight and large-scale data analysis.

2. Coordination, workflow & efficiency: AI automates workflows and redistributes authority within organizations, reshaping work coordination.

3. Innovation & knowledge work: AI, as a creative partner, contributes to new ideas and designs,by enabling knowledge discovery and innovation-oriented systems.

4. Marketing/sales and retail trade:AI can enhanceand improve targeting and customer experience, with efficiency gains extended externally (customers, markets) and internally (resource/environmental optimization).

5. Human interaction and collaboration: AI can be treated as a *collaborator* rather than a tool,because AI doesn't just execute tasks but actively partners in judgment, creativity, and coordination.

2.2. PayTechs definition

The concept of "FinTech", which combines technology with finance (Benzeroual & kerzabi, 2024) to improve and digitize financial services (Ghaouti & Issa, 2025), remains without a universally accepted definition, given its relative novelty as a field of inquiry(Polasik et al., 2020). The literature identifies two principalapproaches to conceptualizing the term: a subject-based approach, which centers on the digital technologies adopted by financial institutions (whether banks or non-bank entities), and an object-based approach, which delineates a distinct sector of non-bank financial firms whose business models are inherently technology-driven(Polasik et al., 2020). Some scholars have proposed hybrid definitions integrating elements of both perspectives (Polasik et al., 2020).

Within this broader landscape, several authors have more recently introduced the term "PayTech" to denote the intersection of payment innovation

and financial technology. Thakor (2020), for instance, examines the relationship between payment system innovations and FinTech through a review of the literature on FinTech's interaction with the banking sector, while Polasik et al. (2020) demonstrate that the implementation of the Payment Services Directive (PSD2) triggered a rapid, though ultimately temporary, surge in PayTech startups across Europe(Hadj Ali, 2025; Irimia-Diéguez et al., 2024). PayTech, short for "payment technology" (GDSLink, 2025), is understood as the convergence of payments and information technology (IT) (Irimia-Diéguez et al., 2024), constituting a distinct vertical within the broader FinTech ecosystem focused on digital payment solutions, payment processing services, and monetary transactions (Cao et al., 2021; GDSLink, 2025; Irimia-Diéguez et al., 2024; B. U. I. Khan, Olanrewaju, Baba, Langoo, & Assad, 2017; Polasik et al., 2020). The category encompasses firms that develop innovative payment solutions capable of enhancing existing payment methods through technological advancement, while also introducing novel approaches that respond to evolving consumer needs and market trends, thereby improving the overall user experience (Chishti, Craddock, Courtneidge, & Zachariadis, 2019; Esin, 2019; Irimia-Diéguez et al., 2024; Polasik et al., 2020). Phenomena such as digital payments, digital and electronic money, online payment systems, mobile payments, QR-code-based payments, wearable and biometric payment methods, contactless cards, digital wallets, and direct bank transfers are now subsumed within this broader industry designation of "PayTech" (GDSLink, 2025; Irimia-Diéguez et al., 2024).

PayTech is widely regarded as the most significant and fastest-growing segment of the broader FinTech industry (Cao et al., 2021; Irimia-Diéguez et al., 2024; Lim, Kim, Hur, & Park, 2019; Thakor, 2020), particularly from the standpoint of consumer-conducted financial transactions (Cao et al., 2021; Chishti et al., 2019; Irimia-Diéguez et al., 2024; Lim et al., 2019). Its growing prominence (GDSLink, 2025) is attributed to its capacity to render electronic payments faster, more seamless, and more globally accessible (Esin, 2019; Irimia-Diéguez et al., 2024), affording consumers greater control over the timing and manner of payment and thereby shaping the trajectory of money within an increasingly digitalized economy(GDSLink, 2025).

Despite this growing significance, research on payments and the development of PayTech entities has, to date, been addressed largely as a subsidiary concern within broader FinTech scholarship (Gomber, Koch, & Siering, 2017; Polasik et al., 2020). A notable exception concerns mobile payments, which have already been the subject of extensive research across multiple dimensions, owing to the sustained growth of mobile payment solutions as a precursor to

contemporary PayTech developments (Iman, 2018), both in highly developed economies and in developing countries, where such solutions additionally serve an important function in advancing financial inclusion (Polasik et al., 2020). Notably, PayTech services are not offered exclusively by non-traditional market entrants, such as high-tech firms and FinTech startups; established banks likewise play a substantial role in the development of innovative payment services by extending their traditional offerings into online and digital channels (Irimia-Diéguez et al., 2024; Liu, Ben, & Zhang, 2019)

3. Development and Kinds of the PayTech

The financial services sector, and payment solutions in particular, is undergoing substantial growth driven by converging technological, economic, and behavioral factors (Anaza, Bennett, Andonova, & Anaza, 2022; Czechowska & Paduszyńska, 2024; Jaiswal & Singh, 2023). This expansion is underpinned by ongoing advances in information and communication technologies (ICT) and broader globalization processes (Czechowska & Paduszyńska, 2024), as well as by rising internet and smartphone penetration rates that have accompanied the projected substantial growth of e-commerce (Anaza et al., 2022; Jaiswal & Singh, 2023). Within this context, digital payment systems are progressively transitioning toward a new paradigm marked by cashless, virtual, automated, flexible, faster, and interoperable transactions, in contrast to the constraints of traditional payment infrastructures (Anaza et al., 2022; Jaiswal & Singh, 2023).

Within this evolving landscape, PayTechs have emerged as a disruptive force reshaping the conduct of financial transactions worldwide and challenging the position of incumbent institutions (Moro-Visconti, Cruz Rambaud, & López Pascual, 2020). In response, digital retail banking channels are increasingly evolving into comprehensive platforms that extend beyond core banking to encompass adjacent services such as mobility, healthcare, and trade, notably through the integration of marketplace functionalities directly within banking applications to support online purchasing (Czechowska & Paduszyńska, 2024).

A distinguishing feature of PayTechs relative to traditional banks lies in their scalable, technology-first business models(Moro-Visconti et al., 2020). Empirical evidence suggests that the market valuation dynamics of PayTechs align more closely with those of technology firms than with conventional financial institutions, a pattern that reflects investor confidence in their innovation-oriented growth trajectories (Moro-Visconti et al., 2020). This technological orientation is further evidenced by recent innovations within the sector, including the deployment of enhanced security mechanisms; such as offline payment solutions built on Trusted Platform Modules and Secure Elements; alongside the growing incorporation of artificial intelligence and machine learning techniques for fraud detection,

transaction optimization, and the personalization of payment experiences (Cao et al., 2021; Reddy & Banda, 2024).

3.1. Kinds of PayTech Solutions

Among fintech providers, payment, clearing, and settlement services constitute the largest category, followed by credit, deposit, and capital-raising services (Thakor, 2020). The growing importance of payment systems within the digital economy (Cao et al., 2021) is particularly pronounced in countries with higher rates of financial account ownership (Thakor, 2020).

Recognizing that fast, efficient, secure, and risk-averse payment systems constitute a source of competitive advantage (Cao et al., 2021; GDSLink, 2025), innovative PayTech startups continuously develop new solutions aligned with evolving consumer expectations (GDSLink, 2025), while customers increasingly select providers based on their ability to optimize authentication, billing validation, and risk management in contactless transactions (Cao et al., 2021).

Several interrelated payment channels underlie this transformation of the digital payments landscape.

3.1.1. Digital paymentprocessing.

The proliferation of online commerce has generated growing demand for electronic payment solutions (Gomber et al., 2017), defined by Hartmann (2006, as cited in Gomber et al. (2017) as payments that are initiated, processed, and received entirely electronically, or simply through internet (Boussouf & Belkaid, 2021). Although early electronic payment systems were modeled closely on traditional account-based bank transfers, subsequent innovation has produced platforms and infrastructures better suited to the needs of merchants and consumers conducting transactions online (Gomber et al., 2017; B. U. I. Khan et al., 2017).

3.1.2. Mobile payments:

Considered a subcategory of electronic payments (Gomber et al., 2017), mobile payments encompass person-to-person, consumer-to-business, and business-to-business transactions (GDSLink, 2025) and serve as a gateway to broader mobile financial services, including banking, insurance, loans, and investment products (GDSLink, 2025). Definitions in the literature vary: De Bel and Gâza (2011) emphasize that the payer's location and supporting infrastructure are largely irrelevant, while Mallat (2007) defines mobile payment as the use of a mobile device to transfer funds from payer to receiver, with or without an intermediary. De Bel and Gâza (2011) further characterize mobile payment as a funds transfer in which the mobile device is central to both initiating and confirming the transaction. Beyond traditional financial institutions, major

technology firms such as Google, Amazon, and PayPal have entered this space (Contini, Crowe, Merritt, Oliver, & Mott, 2011; Gomber et al., 2017), reflecting a broader shift from mobile-enabled access to existing banking services toward mobile applications designed to substitute established payment instruments such as cash, cards, or checks (Gomber et al., 2017).

Mobile payment methods can be further disaggregated into digital wallets, peer-to-peer transfers, and cross-border transfers.

A. Digital and mobile wallets:

Mobile wallets represent one of the most promising areas of innovation in consumer-to-business payments (Omarini, 2018), enabling consumers to complete online transactions without disclosing credit card information (Thakor, 2020). Functioning as digital analogues to physical wallets, they store identification information, facilitate cash and credit payments, and retain temporary tokens such as vouchers or tickets (Gomber et al., 2017). The widespread adoption of smartphones has accelerated the diffusion of digital wallets (Thakor, 2020), which have the potential to replace not only conventional payment instruments but also physical identification and ticketing items (Contini et al., 2011; Gomber et al., 2017; Shetty, Shetty, & Amale, 2014; Thakor, 2020). Digital wallets further offer functional advantages absent from physical wallets, including expansive storage capacity, location awareness, and efficient retrieval of contents (Shetty et al., 2014). PayTechs have capitalized on this trend by developing secure solutions for storing payment information on mobile devices (Omarini, 2018), with digital wallets poised to eventually integrate peer-to-peer payments, tickets, boarding passes, access credentials, and identity verification functions such as driver's licenses and passports (Thakor, 2020).

B. Peer-to-peer (P2P) payments:

P2P payments, occurring directly between private individuals (Gomber et al., 2017), offer near-immediate transaction settlement relative to conventional bank transfers, with service providers validating transactions prior to formal crediting of the recipient's account (Gomber et al., 2017). Because such transactions eliminate the need to share banking details with unfamiliar parties, they are perceived as more secure (Bradford & Keeton, 2012). The literature distinguishes three P2P models (Bradford & Keeton, 2012; Gomber et al., 2017):

- the nonbank-centric model, in which a nonbank intermediary executes the transfer on the payer's instruction, though at the cost of requiring both parties to disclose banking information to an unfamiliar provider (Bradford & Keeton, 2012; Gomber et al., 2017);
- the bank-centric model, in which the individual transacts directly through their bank without engaging a third-party provider (Gomber et al., 2017),

offering lower security risk (Gomber et al., 2017) but limiting participation to customers of banks that provide such services (Gomber et al., 2017);

- and the card-centric model, in which funds are transferred entirely through a credit or debit card network directly between payer and payee card accounts (Bradford & Keeton, 2012; Gomber et al., 2017), a model constrained by the requirement that both parties hold cards compatible with the same network (Gomber et al., 2017).

C. Cross-border transfers:

PayTechs have also introduced significant innovation in international payments and remittances, reducing transactional friction and cost while strengthening data protection relative to traditional banking channels, thereby better meeting user expectations in cross-border payment scenarios(Allums, 2014; Dev, Gupta, Dharmavaram, & Kumar, 2024).

3.1.3. Biometricauthentication:

Large-scale PayTechs function as global payment processors, supplying infrastructure and tools designed to optimize transaction authorization rates for merchants and platforms (Vangara & Egg, 2024), with various context-specific interventions available to enhance authorization outcomes (Vangara & Egg, 2024). Biometric authentication, which relies on attributes unique to the individual, plays a critical role in protecting sensitive data within payment applications (GDSLink, 2025) and substantially reduces the risk of fraud and unauthorized account access, thereby strengthening the security of digital payments (GDSLink, 2025).

3.1.4. Alternative paymentmethods (APMs):

APMs provide cashless or cardless means of transferring funds, affording greater flexibility than conventional credit or debit cards (GDSLink, 2025). Prominent examples include cryptocurrencies such as Bitcoin and Ethereum, which enable secure, decentralized, and borderless transactions and are regarded as among the most disruptive innovations fintechs have introduced into payment services as a potential alternative to fiat currency (Thakor, 2020); notably, resistance to central bank digital currencies stems partly from their departure from the decentralized, permission-less, and anonymous character associated with cryptocurrencies(Thakor, 2020). Additional APMs include buy-now-pay-later (BNPL) services, which allow consumers to spread purchase costs over time, often interest-free, and open banking, which enables secure sharing of financial data with third-party providers to access innovative payment products (GDSLink, 2025). Collectively, APMs are gaining traction by expanding consumer choice and payment convenience (GDSLink, 2025).

3.2. Artificial intelligence (AI) and machine learning:

AI and machine learning technologies are reshaping PayTech by transforming how payments are secured, assessed, and personalized (GDSLink, 2025). Applications include fraud detection and risk management (Hadj Ali, 2025), whereby machine learning algorithms identify anomalous patterns from historical data even as fraudulent techniques evolve. AI anticipates user preferences to recommend relevant payment options by enabling payment personalization and accurate credit scoring through analysis of data extending beyond traditional credit reports (GDSLink, 2025).

4. PayTechs' successfactors and determinants

FinTechs have gained increasing prominence within the financial and banking sector, emerging as a disruptive innovation capable of reshaping traditional financial markets (Moro-Visconti et al., 2020). The COVID-19 pandemic underscored the relevance of the interconnection between sustainability, finance, and technology, prompting countries worldwide to reconsider traditional operating models in favor of greater reliance on technology and sustainability (Moro-Visconti et al., 2020). Consumption patterns and consumer behavior proved particularly consequential during this period, with digitalization emerging as a central driver of new modes of living (Yang et al., 2021).

The development of FinTech, and by extension PayTech, is shaped by an interplay of external and internal factors (Błach & Klimontowicz, 2021). External determinants include technology developers, the preferences of financial services customers, other financial institutions, and the prevailing legal environment (Błach & Klimontowicz, 2021), as well as broader technological progress, demographic trends, regulatory change, and shifts in the socio-cultural, economic, and political landscape (Błach & Klimontowicz, 2021). The proliferation of internet-based digitalization has, in turn, accelerated the transition of globalization and payment systems from manual to online transactions, fostering growing dependence on electronic money (e-money) (Yang et al., 2021), while the expansion of service providers and delivery networks has enhanced the trustworthiness of electronic payments amid rising adoption of online services (Yang et al., 2021).

PayTech firms capitalize on these external dynamics; technological progress, demographic trends, regulatory change, and socio-cultural, economic, and political shifts, while leveraging simpler organizational structures to deploy new payment technologies more rapidly than traditional banks (León, 2021; Polasik et al., 2020). Given the wide array of factors shaping FinTech development, identifying which are of particular significance for PayTech specifically remains an open question (Błach & Klimontowicz, 2021). Among internal determinants, organizational culture and structure are most frequently cited, enabling PayTechs to deploy new

technologies more rapidly than traditional banks and thereby better address evolving customer expectations (Błach & Klimontowicz, 2021). More broadly, PayTechs' operating activity stems from technological development, novel organizational forms, and the integration of internal and external ideas and market-entry pathways; dynamics consistent with the open innovation paradigm (Błach & Klimontowicz, 2021).

Empirically, Polasik et al. (2020) similarly distinguish between internal and external determinants of PayTech development. Internal factors chiefly concern organizational structure: owing to comparatively simpler structures, PayTechs (and FinTechs more broadly) exhibit greater agility in deploying new technologies than traditional banks, positioning them as direct competitors to incumbent institutions(Polasik et al., 2020). External factors encompass technology developers, financial services customers, other financial institutions, and the legal environment in which these actors operate (Polasik et al., 2020), alongside technological progress, demographic trends, regulatory change, and socio-cultural, economic, and political shifts (Polasik et al., 2020). Building on this framework, Polasik et al. (2020) categorize the determinants of PayTech development into three groups:

- market potential within a given country (e.g., domestic trade flows and output, proxies for trade cost, GDP, GDP per capita, GDP growth, and population);
- the level of development of the payment system and consumer payment habits (e.g., direct debit and card usage);
- and the public environment, encompassing the regulatory framework and policy stance on financial access; an area of particular importance given that FinTech innovation frequently outpaces corresponding legal regulation.

More broadly, the general economic climate, including the ease of establishing and operating a business, affects all market entrants, including PayTechs(Polasik et al., 2020).

4.1. Challenges

While digital payments offer banks opportunities to diversify services and generate new revenue streams (Omarini, 2018), the inherent unpredictability of FinTech innovation introduces greater uncertainty than conventional e-banking, contributing to persistent customer hesitancy toward adoption and, consequently, constraining sector growth (Moro-Visconti et al., 2020). Regulatory lag constitutes a further challenge, as the rapid pace of technological development in the payments

industry frequently outstrips corresponding legal frameworks, creating substantial difficulties for financial supervision (Polasik et al., 2020).

Cao et al. (2021) offer a broader taxonomy of challenges confronting FinTech business areas and their associated economic-financial (EcoFin) domains, organized across three scales.

- At the environmental scale; challenges include :
  - environmental complexities (modeling interactions between a target system and contextual factors),
  - regional and global challenges (managing relations between an economic entity and its regional or global counterparts),
  - integrative complexities (systematically managing the interdependencies among these various complexities),
  - and business complexities (representing and managing the structures, dynamics, and uncertainties characterizing a market, product, or participant).
- At the business scale; challenges encompass :
  - innovation challenges (developing novel, efficient, and sustainable mechanisms, products, and platforms),
  - dynamic complexities (modeling and managing the evolving, non-stationary behavior of markets and participants),
  - and data complexities (managing data quality, misinformation, and complex data characteristics).
- At the organizational scale; challenges include :
  - organizational and operational complexities (managing diversity, coherence, and performance variability across individuals and teams)
  - and human and social complexities (managing the cognitive, emotional, and technical diversity of participants while enabling effective communication and collaboration).

4.2. Opportunities

Finance remains among the most dynamic, data-intensive, and technologically sophisticated domains (Cao et al., 2021). With a nuanced and a context-specific relationship between FinTech evolution, market discipline, and financial stability (Hajji Dhahri, Ben Solatne, & Affi, 2025), FinTechs generally, and PayTechs specifically, hold considerable promise for disrupting and reshaping the financial industry by reducing costs, improving service quality, and fostering a more diverse and stable financial landscape (Moro-Visconti et al., 2020), while streamlining transactions and enhancing convenience and security for clients (Dissanayake, Popescu, & Iddagoda, 2023) and narrowing the financial inclusion

gap by extending services to unbanked populations at the base of the pyramid through information and communications technologies (ICT) and novel business models (Moro-Visconti et al., 2020). Financial innovation contains mechanical advances that facilitate admittance to data, exchanging and method for installment (Hafsi & Oueled Salem, 2022). And among all of them, FinTech is widely regarded as the most consequential innovations in the financial industry, evolving rapidly under the influence of the sharing and circular economy, favorable regulatory conditions, and information technology (Moro-Visconti et al., 2020). It is further expected to drive the "smart futures" of finance by fostering technological innovation that yields new business models, applications, processes, or products with material implications for financial markets, institutions, and service provision (Moro-Visconti et al., 2020), particularly in enabling anytime, anywhere, and any-form access, identification, authentication, consumption, payment, and communication across heterogeneous networks and applications, and in automating integrated, the*whole-of-process* business; from product categorization and evaluation to billing, paymentand customer service, passing by market positioning and promotion (Cao et al., 2021).

5. Discussion

In the discussion section, attention will be given to two crucial subsections. The initial subsection will focus on presenting available solutions to overcome challenges and issues in applying AI within the PayTech sector, while the second will explore the future of PayTech with a focus on AI.

5.1. Solutions to overcome the challenges and issues of applying AI in paytechs

To overcome the regulatory objectives, market safety and integrity, and consumer protection challengingthe application of AI within the PayTech sector, several strategic and technical solutions are proposed, despite divergent viewsacross different actors and regions (Vuković, Dekpo-Adza, & Matović, 2025).

For regulatory updates, privacy and transparency concerns, organizations should implement stronger AI governance and data defense systems coupled with federated learning(Saiyed, 2025)(Aladejubelo, Ishola, Raji, & Bamisaye, 2026) alongside enhanced cybersecurity measures and explainable AI (XAI) so that people can trust AI choices, because they caneasilyunderstand how AI is used in finance (Tan, Gupta, Jeenah, Gandhi, & Anckaert, 2025)(Aladejubelo et al., 2026)(Aparicio & Costa, 2026) and how it makes decisions (Aladejubelo et al., 2026)(Tan et al., 2025).To achieve this point real and continuouscollaboration betweenregulatory organizations, technological providers and innovation experts is

needed (Saiyed, 2025) to provide and facilitate innovation, testing and applying in a controlled environments (Vuković et al., 2025).

To complement the landscape of solutions, Tan et al. (2025), in the 2025 McKinsey global payments report, highlight six core strategies that organizations can adopt to overcome AI challenges and capture new value of the future payment flows :

1. Design for intelligent simplicity:to insure that simplicity, transparency, andpersonalization are embedded into offeringsbecausetrust and adoption depend on making complex things simple while keeping control.

2. Treat interoperability as infrastructure:toenhanceorganizations'ability with adaptive infrastructure that supports the bridging of different asset types, jurisdictions, and compliance in real time.

3. Move intelligence to the edge:bytheintegration of the essential functions such as routing logic, fraud detection, and liquidity management directly into software agents, APIs, and workflows, rather than being centralized in batch systems or managed by human, which will allow the decision-making processes to occur at the transaction point.

4. Make compliance programmable: regulatory diversification makes codifying local legal requirements directly into system architecture essential for scalability. Therefore, modular policy engines and region-specific logic will supersede manualworkflows and hard-coded rulebooks.

5. Play through ecosystems, not against them: stand-alone moats will erode, whileembedded roles in larger ecosystems will endure. Therefore, to endure competitive advantage organizations must depend on serving as foundational infrastructure for intelligence, trust, liquidity, or connectivity.

6. Earn trust upstream:as AI and automation increasingly initiate transactions, embedding explainability, transparency, and clear recourse mechanisms into system design is critical for regulatory alignment and user trust.

5.2. The Future of PayTech in light of AI

The trajectory of PayTechs and digital payment adoption varies considerably across regions and firms (GDSLink, 2025), yet the breadth of services these platforms offer increasingly confers a decisive competitive advantage in shaping customer experience (GDSLink, 2025). This is driven by consumer demand for payment experiences that are fast, secure, and personalized, with nearly 65% of hospitality businesses now prioritizing tap-to-pay solutions (GDSLink, 2025). Reflecting this trend, transaction values within the contactless payment market are projected to nearly double, growing from $7.4 trillion in 2024 to $15.7 trillion by 2029, propelled by the continued expansion of tap-to-pay, QR code, and near-field communication (NFC) technologies (GDSLink, 2025).

Artificial intelligence is poised to play an increasingly central role in this evolving landscape, extending beyond its current applications in fraud detection and risk assessment toward more sophisticated, predictive functions that anticipate consumer needs and further personalize the payment experience (GDSLink, 2025). As AI-driven capabilities mature alongside contactless infrastructure, the integration of intelligent systems is expected to become a defining feature of next-generation payment ecosystems, reinforcing both security and convenience simultaneously (GDSLink, 2025).

Nonetheless, integrating contactless and AI-enabled technologies with legacy financial infrastructure presents notable complexity. Cloud-based platforms have emerged as a means of addressing this challenge, offering the flexibility and scalability needed to strengthen data security and cultivate consumer trust through transparent operational practices (GDSLink, 2025).

Complementing this outlook, Dev et al. (2024) identify several avenues for advancing PayTech development. First, they underscore the importance of simplifying e-payment applications to broaden adoption among users with limited technological access or literacy, citing platforms such as WhatsApp as models of effective design simplification. Second, they highlight the need for secure e-wallet authentication architectures that incorporate device-specific identity features alongside two-phase authentication processes to strengthen both security and reliability. Third, they call for the development of user-friendly tools tailored to young adults, enabling more effective management and visualization of daily transactions and budgeting. Finally, they emphasize the importance of enhancing inclusivity within e-wallet applications more broadly.

Taken together, these developments indicate that the shift toward contactless, AI-enhanced payments is fundamentally transforming how businesses approach transactions and customer expectations, establishing new benchmarks for speed, security, and convenience. PayTech is thus enabling businesses of all sizes to meet growing demand for seamless payment experiences while containing costs and mitigating risk(GDSLink, 2025).

Looking forward, PayTech, powered by artificial intelligence, is expected to remain a primary driver of innovation within financial services, continuing to reshape how payments are made and money is managed (GDSLink, 2025). In this perspective, the main applications of AI in PayTechs (payment-focused fintechs) cluster around fraud/risk, personalization, and operations as follow(Areiqat & Aqrabawi, 2023; Ganguly & Arcot; Gotthardt et al., 2020; Jain, 2023; Maple et al., 2023; Qi & Xiao, 2018; Ridzuan, Masri, Anshari, Fitriyani, & Syafrudin, 2024):

1. **Biometric payments :** Replace cards/devices with biometric recognition for instant payments.
2. **Real-time payments and transaction monitoring:** combine registries and live feeds to enable near real-time payment processing and monitoring.
3. **Back-office automation and processing:** by Robotics Process Automation (RPA) orchestration augmented with AI, the organizations can automate reconciliation, settlement, and routine payment operations to cut costs and errors.
4. **Financial crime prevention and fraud detection**: AI helps detect money laundering and fraudulent reporting by analyzing large datasets to detect anomalies and prevent fraud. The AI algorithms can immediately scan large volumes of transactional data in real time, allowing the identification of unexpected trends, anomalous patterns, suspicious activity and potentially fraudulent activities. AI systems may also continuously learn from fresh data using machine-learning techniques, increasing their ability to successfully detect and prevent fraud.
5. **Customer service**: AI chatbots virtual assistants can handle multiple queries simultaneously, offering personalized recommendations, resolving issues quickly and providing a 24/7 support.
6. **Credit risk assessment and scoring**: Machine learning, in contrast to traditional methods, improves accuracy in lending decisions by assessing a broader range of variables and historical data; which leads to more precise risk assessments and better loan portfolio management.
7. **Investment management**: AI automates portfolio management, risk assessment, and trading strategies, by processing large volumes of market data, news, and historical trends.

6. Conclusion

Recent academic literature on FinTech demonstrates a notable surge in both popularity and scholarly output within the field (Czechowska & Paduszyńska, 2024; Dissanayake et al., 2023). This growing body of work reflects the steady expansion of the market, driven by its increasingly diverse range of actors (Czechowska & Paduszyńska, 2024). Among these are relatively new categories of providers, such as national payment institutions and small payment institutions, which further illustrate the sector's dynamic evolution (Czechowska & Paduszyńska, 2024).

Importantly, the provision of PayTech services, particularly mobile payment and mobile banking, is not confined to non-traditional entrants such as high-tech firms and FinTech startups. Traditional banks likewise play a substantial role in the

development of innovative payment solutions by extending their conventional service offerings to online channels (Irimia-Diéguez et al., 2024; Liu et al., 2019).

6.1. Contributions

The contributions of the present article can be divided into two phases. On one hand, the theoretical implications highlight the expansion and advancements of digitalization in PayTech, which will support future researchers in understanding popular themes and identifying research gaps to pursue investigating new topics. On the other hand, the practical implications enhance managers and businesses' awareness of the challenges and opportunities that have been highlighted when it comes to the use of AI in PayTech, which will help them, in return, in formulating their strategic orientations.

6.2. Limitations

Despite the current study's scholarly advances, it suffers from a number of limitations, the most notable of which is the reliance on a descriptive literature, which may not capture the full depth of causal relationships or underlying patterns that a more rigorous methodology, such as bibliometric analysis or a systematic literature review, could reveal.

6.3. Suggestions/Recommendations

At this point, it is crucial to determine research recommendations, such as:

- Enhancing qualitative approaches studies to improve more comprehensive understanding of consumers' perceptions of the AI integration in the PayTech sector;
- Strengthening the confidentiality and security of personal data in order to change the skeptical view of artificial intelligence;
- Taking all ethical and consumer protection concerns seriously and sincerely into account in order to prevent this field from deviating toward obscure practices such as data misuse or deceptive marketing.

6.4. Future perspectives

To close the present gap and enable greater usage of AI in the PayTech sector, we suggest the following future research directions:

- Long-term study approaches to investigate the enduring effectiveness and efficiency of AI integration in PayTech services;
- Worldwide comparison assessments to examine the cross-cultural success of AI integration in PayTech models, which will unearth the contrast between all nations interested in this concept, including developing economies with limited financial infrastructure;
- Cost-effective solutions for AI integrated in PayTech services;

- Multidisciplinary research combining technical discoveries with regulatory and financial compliance.

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