

# Transforming Financial Interactions: The Evolution of Digital Payments

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**Abstract** – The rapidly evolving technologies are transforming financial interactions, with digital payments becoming a catalyst for change. This report explores their evolution, from early online payments to mobile wallets and blockchain technology. It analyses key developments, technological innovations and the impact on consumers, businesses, and the economy. The COVID-19 pandemic has accelerated their adoption, making them an integral part of our daily lives. Despite the convenience, speed, security, and transparency, digital payments also pose challenges such as cybercrime and digital division. Effective regulations, technological innovation and continued attention to security are critical to their sustainable development. Blockchains, cryptocurrencies, central bank digital currencies (CBDC) and contactless technologies will shape the future of digital payments, making them even faster, more secure, more convenient, and more accessible to all. Understanding their development is key for all participants in today's economy.

**Index Terms** - Digital Payments. Evolution. Benefits. Challenges.

## I. INTRODUCTION

In today's world of rapid technological innovation and digital change, digital payments are becoming the impetus for a transformation in the field of finance. From the first online payment to the launch of mobile wallets and the integration of blockchain technology, this continuous evolution is enriching the way society, and businesses interact with money. Digital payments not only provide a fast and convenient way to make transactions, but also create new standards of safety, transparency, and flexibility. In this context, exploring technological developments becomes essential to understanding the future of payments and financial relationships. This report will explore the evolution of digital payments, focusing on key milestones in their development, the technological innovations that complement them, and trends for the future. In the fast-changing world of financial technology, important aspects are the new opportunities and how they are reshaping the way the world uses and manages its finances and the threats to consumers and businesses from this new reality.

## II. DIGITAL PAYMENTS: EVOLUTION, BENEFITS, CHALLENGES AND REGULATORY FRAMEWORKS

The early 2010s marked the dawn of the digital payments revolution with the advent of the first mobile wallets. In this

period, Google Wallet and Apple Pay released as pioneers in providing consumers with a means to make contactless payments through their mobile devices. In 2011, Google Wallet made the first steps into the world of mobile payments, providing users with the ability to link their credit and debit cards to their Android devices. This milestone is marked by a combination of innovation, challenges and gradual adaptation to the innovative way of payments. In the same period, Apple introduced Apple Pay, which combines safety, convenience and design. The system uses Near Field Communication (NFC) technology, which enables different digital devices to exchange information when placed next to each other. The main advantage of NFC is in terms of security of contactless transactions. Touch ID (and later Face ID) also serves to confirm payments using biometrics quickly and securely. This stage creates standards for future mobile wallets and influences consumer acceptance. It marked the beginning of the digital payments' revolution, with tech giants leading the way to a new way of managing finances and making transactions. In the following years, the combination of mobile wallets with software and hardware innovations set the stage for explosive growth as contactless payments became commonplace. Part of the developments that have contributed to the evolution of digital payments are the development and deployment of blockchain technologies for secure and transparent transactions, the unification of Google Wallet and Android Pay into a single mobile wallet – Google Pay. In 2019, the proliferation of mobile wallets is becoming more widely accepted in various countries and areas around the world, promoting contactless payment.

During the pandemic of COVID-19, digital payments emerged as an inevitable part of our financial lives. This period accelerated their adoption and changed the way consumers and businesses perceive and use these technologies. This moment in history formed a new context for digital payments, spurring innovation and validating their role in our everyday lives. With the advent of the pandemic (late November, 2019 in China and March, 2020 in Bulgaria), consumers have quickly adapted to the demands of social distancing and minimizing physical contact. As a major driver of change, experts advised to avoid using coins and banknotes to limit the risk of infection. This transition to the 'new normal' has necessitated the need for safer and more hygienic payment methods. As a result of this context, digital payments, by providing contactless payment options through mobile

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devices and online platforms, have become the preferred choice for consumers. The trend of increasing online transactions started to be observed in the pre-pandemic period. This is shown by multiple data points, one of which (Mastercard) shows that the number of online transactions in fast moving consumer goods, sports and home equipment reached an impressive growth of 160% in 2020 compared to 2019. The trend has become a habit and for the first six months of 2021, the number of card payments and e-money payments in the country saw an increase of around 30% compared to the same period last year. The idea of safe and fast transactions has contributed to the increased demand for e-wallets, mobile payment apps and other innovative digital transaction methods. During the pandemic, there was also a significant growth in online shopping, which also impacted payments. According to STATISTA research, online purchases by individuals from Bulgaria doubled in 2023 compared to 2019, with the highest growth in 2021 compared to 2020. Consumers have learned to value the convenience and safety provided by digital payments, which have proven to be principal factors in ensuring frictionless shopping and commerce. The pandemic has not only accelerated the transition to digital payments, but also created lasting behavioral changes in consumers. These changes include the continued preference for contactless payment methods and habituation to the convenience of technological solutions. According to a Visa study, one-fifth of consumers decline a purchase due to a lack of card payment options. The pre-data from the payment statistics for Bulgaria, collected by all payment service providers and branches of payment service providers licensed by the Bulgarian National Bank, show that at the end of 2023, almost every fifth transaction in Bulgaria will be with a digitized card, or 18.5% of all transactions, and the increase compared to 2022 is almost double. People who adapted to the new conditions formed habits that remain after the pandemic is over. This period proved to be an important moment in the history of digital payments, transforming them from an option to an integral part of everyday financial practices. This is what the data shows - in 2023, the total number of card payments in Bulgaria will grow by 21.8% compared to 2022.

The period also proved to be conducive to innovation, which improved existing payment systems and introduced new, fully digital aspects. There were increased interest and more people using existing mobile wallets. In the past 2023, payments with digitized cards (cards added to a digital wallet for payment) doubled in Bulgaria. Payment watches have attracted attention for their convenience and safety. Consumers increasingly prefer these smart watches that not only tell time but also provide the ability to connect to bank accounts or e-wallets to make payments with a light touch to the device. A crucial point of the digitization of payment processes is also the possibility of online banking, which existed before the pandemic, but it is this that has forced its use on a wider range of users. This saves them going to banks, physically interacting with staff, seeing their financial balances in real time and being able to order transfers to other accounts, all from just their phones. Along with online banking in the context of traditional banks, instant payments, which are available 365 days a year, 24 hours a day, have also become exceedingly popular. The payment takes about 10 seconds - from the moment of the

payment order to the moment the recipient receives the money. QR-codes have become an integral element of digital payments and technological advancements. With the advent of COVID-19, they have become particularly useful for contactless transactions. Furthermore, payment wristbands bring style and technology into one. They enable contactless payments, even extending to embedded financial tracking systems or loyalty programs. The integration of innovative technologies such as blockchain and the development of digital currencies has further enriched digital payments, providing a wider range of options and facilities.

The development of digital payments provides a host of benefits that are reshaping the way we engage in our financial interactions, as well facilitations for consumers and the business community locally and globally. In addition to the mentioned benefits such as convenience and speed, another benefit is the deployment of biometric technologies to validate and protect consumers' personal and financial data. The use of biometrics, such as fingerprints, facial recognition, or sensory scanning, provides additional security in digital transactions. These technologies replace or complement traditional identification methods. An example of one of Apple's successful products with built-in biometric verification systems in mobile devices is the previously mentioned Touch ID, which uses fingerprints, and Face ID, which recognizes faces. Another benefit that the development of digital payments brings is the stimulation of economic growth, innovation and transparent transactions in tax collection and profit reporting. A study commissioned by the European Parliament reveals that in 2022, the EU will see a significant increase in the use of digital transactions. Bulgaria had the highest level of grey economy, accounting for 33.1% of the country's GDP. Digital payments would be a powerful tool in the fight against the grey economy. Research conducted by AT Kearney shows that a 10% increase in digital payments can lead to a 4% reduction in the share of the grey economy. For businesses, digitalization is crucial, offering greater competitiveness and access to a wider customer base. According to a survey by MasterCard, more Bulgarian online merchants share the need to prioritize and to prefer card payments over cash on delivery as it saves time and resources for businesses, reducing geographical barriers and opening doors to access international markets. Businesses can easily transact with customers and partners all over the world, increasing their opportunities for growth and profit. Digital payments will also facilitate the process of migration from Bulgarian Lev to Euro. The dual circulation period, when both currencies are accepted, poses a major challenge. When merchants and service providers must make change in euros, contactless payments can help and ease the transition by ensuring seamless payment processes and minimizing uncertainty and misunderstandings. Mobile apps and online banking continue to prove themselves as means of greater transparency and control over consumers' finances. With their help, they can easily track their transactions, check their accounts, and get detailed information about their finances, which contributes to more efficient management. Another application of contactless payments is, for example, more accessible public transport. The adoption of this type of payment is also fundamental for the

sustainability of public transport. More than one hundred European cities, some of which Rome, Berlin, Barcelona, and London, have introduced contactless payment systems in vehicles or through ticket vending machines located in stations, metro stations or bus stops. Examples of such practices are the regional trains of the Austrian State Railways (ÖBB – Österreichische Bundesbahnen), the Polish National Railways (PKP – Polskie Koleje Państwowe). This makes public transport more affordable and at the same time provides an environmentally friendly alternative to other means of travel. In Bulgaria, Visa has partnered with the Centre for Urban Mobility and Sofia Municipality to implement contactless payment solutions for public transport, accessible to all citizens and guests of Sofia and benefiting tourism and economic activity. The company is actively working on urban mobility projects in other major cities in Bulgaria (Plovdiv, Varna, Burgas) to increase convenience and efficiency for all. Overall, the evolution of digital payments not only eases financial processes, but also brings new standards of convenience, security, and efficiency. These advantages not only meet the demands of the modern consumer, but also contribute to the development of the financial industry on a global scale.

However, the increased use of digital payment channels also poses new challenges and despite the handful benefits associated with the development of digital payments, this process is also difficult and brings with it some potential threats. The first, and perhaps most important, is security and privacy. As digital payments grow, so does the risk of cyber-attacks, phishing schemes and other examples of cybercrime that can lead to compromised financial information and serious losses for consumers and businesses. Ensuring the security of payments and customer data is a constant focus for regulators and market participants. Another security threat is the task of storing large volumes of financial data and transaction information. Technical incidents can lead to denial of service, loss of data and, in the worst case, bankruptcies. Another factor that remains overlooked is the digital divide in society. Despite the widespread adoption of digital payments, there are communities and individuals who still cannot take full advantage of these technologies. The digital division creates social and economic inequalities as some people remain excluded from the benefits provided by technological advances.

But what does the future hold for us? How far will contactless payment technologies evolve? Blockchain technology is expected to play a key role in the development of digital payments. It is a decentralised digital ledger that stores information in an immutable and transparent way. This technology promises greater security, transparency and speed by providing a decentralized and impossible-to-modify infrastructure for transactions. Cryptocurrencies such as Bitcoin and Ethereum, as well as various types of stablecoins, are already part of the financial landscape, and the trend is to increase their use for digital payments. Companies like Microsoft, AT&T, Starbucks, Shopify, and Etsy, and even some small businesses in Bulgaria are now accepting cryptocurrencies as a payment method, and this number is expected to grow as well. Implementing artificial intelligence into payment routing maps will help detect fraud, ensuring security and transparency. Payment intermediaries are expected to be removed, allowing direct

payments between users, which in turn will reduce fees. Many central banks are exploring the possibility of issuing central bank digital currencies (CBDC). These are digital versions of traditional currencies issued by central banks themselves. CBDC could change the landscape of digital payments and provide new opportunities for the future payments landscape by combining all the benefits listed so far. Contactless technologies, such as Near Field Communication (NFC), are expected to continue to evolve. Bank cards, mobile phones and other devices will provide faster and more convenient contactless payment methods. Moreover, as the Internet of Things (IoT) grows, devices will become increasingly interconnected, including in payments. Smart devices such as cars, home appliances and even clothing will be able to make payments automatically, which will also create new opportunities and conveniences for consumers. Fin-tech companies continue to innovate in the financial sector, including in the areas of digital payments and tracking financial balances and spending. Examples include Revolut and N26, which offer bank accounts with a range of features not available with traditional banks. TransferWise also offers international transfers at lower costs than banks. These trends, along with many more, will continue to change and improve digital payments in the coming years, creating new opportunities and challenges for consumers and businesses as well.

### III. CONCLUSION

Digital payments are building a new reality in the world of finance, providing consumers and businesses with innovative and convenient payment methods. From the first steps into the world of online payments and the creation of e-wallets, through the development of mobile wallets and contactless technologies, to the integration of blockchain, cryptocurrencies and central bank digital currencies (CBDC), digital payments are going through a continuous evolutionary process. Technological advancements, supported by a growing digital infrastructure, are creating an environment where speed, security and convenience are key words. Benefits for consumers include easy and quick access to their funds, convenience, and greater transparency. For businesses, digital payments mean more efficient transaction management, reduced costs, and greater ability to access global markets. Despite these positive aspects, challenges such as data security, the digital division, and technical failures also need to be addressed. To maintain sustainable and effective development, digital payments must be combined with responsible regulations, innovation in technology and constant attention to security. Digital payments continue to drive financial transformation by creating a dynamic and competitive environment. In the future, these technologies will continue to simplify financial processes, bringing greater freedom and convenience to consumers and businesses.

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