Fintech: Digital Transformation in the Financial Industry

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Abstract: With technological advancement, the traditional finance sector is compelled to undergo a paradigm shift towards digital transformation. This evolution is marked by the emergence of innovative digital financial products, presenting a dual challenge of meeting the growing public demand while effectively managing potential financial risks. This paper delves into a comprehensive exploration of these challenges, with a particular focus on unraveling the intricate relationship between digital innovation and cybersecurity within the financial domain. At its core, the thesis underscores that the ongoing digital transformation in the financial industry, exemplified by the evolution of e-payment systems, robo-advisors, peer-to-peer lending, and cryptocurrencies, is instrumental in optimizing efficiency and convenience. However, this transformation is not without hurdles, notably in the realm of cybersecurity and its impact on traditional financial systems. While the overarching goal of digital finance is to streamline financial transactions and revolutionize financial activities, the simultaneous pursuit of simplicity and efficiency lays bare the vulnerabilities inherent in digital safety and stability.

Keywords: Digital Transformation, Financial Services, Cryptocurrency

1.   Introduction

The financial industry is undergoing a profound paradigm shift fueled by the progression of digital technologies. In a modern era of unprecedented connectivity and technological progression, the financial digital transformation is a beacon of innovation and the center of a storm of risks. This essay explores the transformative impact of digital technologies within four significant platforms: e-payment, robo-advisors, P2P lending, and Cryptocurrency. These four fields support the fundament of present financial transformation and the potential influence of digital development.

The paper will focus on the general analysis of each of the four pillars: the advantages compared with traditional finance services and the threats faced by the development of the new industry. The literature supporting this paper is retrieved in the present decade to amplify the validity of analysis of rapidly developing industries and range globally to illustrate the international transformative features. The analysis of the paper is structured into four sections. Section A will aim at e-payment, demonstrating why e-payment replaces cash as an everyday transaction and what concerns emerge with e-payment development. Section B will focus on comparing Robo-advisors and traditional financial consults and the future needs of Robo-advisors. Section C will indicate why P2P loaning has grown so dramatically and show the potential crisis of P2P platforms. Section D will brief on the

characteristics of encryption currency, as well as the legal and sustainable threats related to those characteristics. The final part is the conclusion section.

2. E-Payment System

E-payment refers to the numerical payment system which allows one to pay money through the Internet. Via online payment, commerce transactions can be made cashless and contactless from companies or individuals to one another. When online payment first emerged, it was invented as the aid of telegraph and cheque in 1910; since the widespread of credit cards in the middle of the 20th century, the public started to accept digital payment as routine [1]. As a result, online payment has shown significant potential and developed rapidly since the late 20th century. In the early 21st century, because of the bloom of online retailing and the advanced evolution of internet security, E-commerce payment became one of the fundaments of financial digital transformation. Unlike traditional cash payments, online payments make three significant differences: convenience, cost efficiency, and data management. These distinctions meet the various needs of customers, service providers, and regulators.

E-payment shows a significant convenience in terms of geography and time. With access to the Internet, users can complete transactions anywhere and anytime, which eases the communication difficulty between customers and merchants. Meanwhile, the accessibility of the payment facilitates the consumption. As the statistics show, the growth of e-payment has a positive impact on both sales growth and online shopping [2]. The e-payment system is optimized to be user-friendly. A more explicit interface and shopping process reduce the barriers to online shopping, which enhances the experience of purchasing online. Since more diverse customers accept online shopping and spend more time browsing goods online, the retail industry meets a dramatic expansion in digital platforms.

Compared with traditional payments, online payments involve less labor and written work. Therefore, e-payment reduces the operation costs of the banking and retailing industries without redundant processes. Meanwhile, the streamlined process minimizes the time costs of transactions. E-payment is reflected in real-time, allowing users to complete the transaction in a few seconds. With the advantage of time and expense, online payment has become the new conventional payment, especially for companies.

Every electronic transaction leaves a cyber footprint, such as cookies, requests, and log history, which is also a vital asset for both customers and regulators. The digital recipient and financial statement are automatically recorded in the online payment system, which allows individuals to trace their expenses and income conveniently. With further data analysis, the users can manage their finances and adjust consumption efficiently. For the government and banks, online payment is a more transparent method than cash to be monitored and regulated. The cyber security system could record the journey of every transaction online and collect it in a centralized platform. The administrators could detect irregularities to prevent potentially illegal activities and analyze the data to trace committed crimes [3].

While online payment is evolving to meet the dynamic needs of customers, the security of e-payment has been a primary concern. Electronic fraud has become one of modern society's most significant digital threats. The European Union categorizes electronic fraud as one of the eight prime threats in 2023 [4]. Despite the advanced improvements in digital security, non-face-to-face, one of the most distinctive attributes of e-payment, still opens the window for illegal activities. Meanwhile, centralizing information could also be a disadvantage; the damage could be severe once personal information leaks. To prevent the leak of information and potential deception during the online payment. Encryption measurement and two-factor authentication are two primary directions to enhance digital security. End-to-end encryption allows the users to encrypt their information, excluding any third party, even the service provider [5]. By limiting access to information, the risks

of leaks could be reduced considerably. Even if the information leaks, two-factor authentication further protects personal finance. The second authentication of face, voice, and fingerprints could minimize the ransomware of digital assets.

3.   Robo-Advise

Robo-advisor refers to the software which provides financial advice to users. The concept of early Robo-advise software emerged in the 2000s; decades later, the first generation of Robo-advisor became popular among financial consults and managers. Since the development of artificial intelligence, Robo-advisors have become popular with the public and transferred to the alternatives of real-person financial advisors. By 2022, the Robo-advise companies had already collected 360 billion US dollars and served over a million users in the United States [6]. The considerable success of robo-advisors raises intense debate about whether AI can replace real financial managers.

The controversy about Robo-advisors and human advisors mainly focuses on the validity of suggestions and accessibility. Robo-advisors provide financial suggestions by algorithm. The AI will collect clients' information, including financial statements, benefits expectations, risk expectations, investment preferences, and timescale. Then, by analyzing the data, Robo-advisors make consistent and objective financial decisions for users in real-time. Without potential bias and interest conflicts, Robo-advisors are more trustworthy and reliable for clients who lack financial understanding. The questionnaire shows that over 50% of clients believe Robo-advisors are more ethical than traditional advisors[7].

On the other hand, since the mathematical models fully determine the decisions, Robo-advisors' decisions are limited by the algorithm design and occasionally misunderstand users' needs for dynamic market change. Traditional financial consulting provides more personalized advice than Robo-advisor. With the participation of trained financial managers, clients can further understand their financial needs and discover new investment preferences, and therefore, they can receive a more comprehensive and adaptive plan. However, personalized financial advice costs time, so the outcome of human advisors must reflect and adapt slower than Robo-advisors.

Robo-advisors are more accessible for investment beginners and small investors. Robo-advisors' fees are less than human advisors, and the barrel of robo-advisors is smaller. According to Warchlewska's statistics, the average minimum investment required for Robo-advisors is 36000 dollars, and the average management fee is 0.94% [7]. The Robo-advisors gather massive numbers of small investors with more affordable costs and requirements and accumulate substantial funds in the investment market. Over 90% of the clients in the three biggest global Robo-advising companies are small investors [8]. However, the study barrel of Robo-advising is still existing. While the Robo-advisor needs financial data to analyze clients' investment expectations, it is difficult for beginners to deliver personal information precisely. In a sample of 200 people using Robo-advising, only 17% are non-post-educated [7]. Because of the study barrel of financial investment, the information asymmetry and understanding between clients and advisors prevents potential customers. Recently, Robo-advisors have been questioned about their legitimacy. For example, Guo indicates that the uncertain role of Robo-advisors prevents its development in China[9]. Without a clear legal definition, Robo-advisors cannot be regulated effectively, which may cause legal loopholes in information leaks, schemes, and unlawful transactions.

Another concern about Robo-advising is whether Robo-advising can replace humans. In recent years, many traditional financial institutions, such as BlackRock, Vanguard, and Goldman Sachs, have developed their Robo-advisors to adapt to the new market trend, which enhances their existing business and also maps a new pattern of financial advising [10]. Therefore, organic integration of Robo and human advisors is feasible; the Robo-advisors can expand and evolve traditional financial consulting, while the human advisor could fill in the legal blanks as liable parties.

4.   P2P Lending

Peer-to-peer lending is an emerging loaning method where a borrower connects to a lender through digital platforms; the service providers are information intermediaries rather than financial institutions. P2P Lending has been blooming for decades as a rising investment and alternative mortgage choice. By 2023, the global market of P2P lending has grown to 188 billion US dollars, and the future size in 2032 is expected to increase to 1200 billion [11].

One of the reasons why P2P Lending proliferates is unmediated transactions between borrowers and lenders. Excluding traditional institutions, inter-peer loaning offers more affordable interest rates and flexible terms for borrowers. P2P lending maximizes the possibilities of free bargaining between borrowers and lenders, which allows users to determine interest rates, terms, and repayment methods mutually optimized for borrowers and lenders. Therefore, borrowers, especially those who are unaffordable or unwilling to apply for a long-term, expensive mortgage, can reduce their financial burden efficiently. P2P lending shows advantages in microcredit, such as personal finance, student loans, and small business loans.

On the other hand, the lender benefits from P2P profitability. As determined by interest rates and terms, the lenders receive the expected interest return regularly. Compared with traditional loaning, inter-peer mortgages leverage fewer finance requirements and shorter repayment terms to open a window for individual investors. The LenDenClub Int website shows that their average loan terms range from 3 months to 6 years, while the minimum investment requirement for lenders is 120 US dollars [12]. Small-scale investment controls financial risks, while short payment terms provide efficient returns. As a result, an increasing number of small investors choose to put their money in P2P lending platforms for quick and steady returns.

The other reason for P2P prosperity is the advanced progression of digital platforms. Many pricing mechanisms have emerged with the development of inter-peer loaning, such as borrower pricing, auction pricing, and platform pricing [13]. The difference among those mechanisms impacts transaction speed, financial outcomes, and users' actions. These various market choices help each side of inter-peer lending optimize their financial strategies and plans using their preferred mechanisms. Meanwhile, machine learning assists the users in breaking the understanding barrels. The digital platforms feature advanced data analysis and personalized suggestions, allowing users to locate valid information efficiently. The practical information recourse enables users to rapidly and clearly understand the financial plans, reducing misinformation risks.

Although the inter-peer mortgage industry is dramatically growing, public concerns about credit disruption and financial security are magnifying. P2P lending values one's credit abilities based on personal information online, such as asset value, income, and loan purpose. Without the traditional authoritative intermediaries to verify the validation of borrowers, the misinformation about borrowers' credit is hardly detectable by personal lenders, which leads to the possibility of financial fraud. Since digital platforms complete transactions online, identity theft is another problem that threatens users' credit. Any leak of personal information can be manipulated to deceive lenient evaluation on P2P platforms, which causes credit damage to users. Meanwhile, the absence of intermediaries causes the weakness of supervision and regulation. Personal lenders struggle to protect their rights from delayed payment, insufficient payment, and defaulting loans. The lack of supervision also shows in over-debt. Without an integrated credit value system, borrowers can overload their liability from different P2P platforms. The over-debt can inflict severe debt stress on borrowers and, as a result, cause financial loss to lenders once the loan default happens.

Meanwhile, since the emergence of P2P platforms, personal financial security has been significantly threatened. The intense competition and fast development can lead to the ethical issue of platforms. The scale of the P2P lending industry in China had grown 60 times from 2013 to 2017

[13]. The dramatic bloom of industry led to a legal vacuum in very short terms: the platforms provide interest rates lower than market expectations; companies use dial and email spamming to advertise. The unfair competition of those P2P platforms harmed public financial security and personal privacy. Even worse, when P2P platforms enhanced their financial roles in loan transactions, the loose P2P regulation created a breeding ground for financial crime, such as money laundry, loan sharking, and unlawful personal information trade. Summing up those security threats and concerns, China's authorities closed all domestic P2P lending platforms by December 2021. The failure of the Chinese P2P lending industry indicates the potential harm of unsupervised P2P platforms. As an information intermediary, the inter-peer loan platform lacks the legal enforcement and supervision that traditional loaning institutions have. While the P2P loaning companies shift their roles from information platforms, limited supervision will create the possibility of financial crimes. Therefore, there is still constant debate on how to find a proper legal, secure, and influential role in the overall finance market for P2P lending. Recently, many developed P2P companies have sought to connect with the credit systems of banks to enhance their evaluation abilities and information security. At the same time, traditional loan institutions need a new platform to expand their markets. The organic cooperation between newborn platforms and traditional finance services has been one of the most popular and optimistic directions for P2P lending.

5. Cryptocurrency

Cryptocurrency is a non-substantial currency based on blockchain technology. The blockchain is a decentralized and distributed ledger to store transaction information. The attributes of blockchains allow Cryptocurrency to be transferred from person to person without any third party, with characteristics such as anonymity, encryption, decentralization, and volatility. The Cryptocurrency has no attributes indicating belonging but only an encrypted code to access the currency. Even the parties of the transaction could not trace the flow of cryptocurrency. Meanwhile, the transaction only needs to deliver the access code of currency, which allows the users to complete the transfer in a few seconds without any intermediary service or third party. As a digital currency with limited supply but no regulation of third parties, cryptocurrency price is determined by the demand and supply. Therefore, Cryptocurrency fluctuates rapidly with factors such as market demand and supply, government regulations, and economic trends. Because of the characteristics of Cryptocurrency, cryptocurrency investment has grown dramatically in past decades. Bitcoin, the first and most known Cryptocurrency, was invented in 2009, and then nearly 900 cryptocurrencies emerged in 2017 [14]. The number of cryptocurrencies soared to 3600, and the value of the cryptocurrency market summed to 350 billion in 2020 [15].

Despite its significant profits in investment, the characteristics of Cryptocurrency threaten personal information, web security, and financial stability. The assets of Cryptocurrency can only be claimed by the PIN or access code, which means the information could be lost if one forgets the code or could be stolen without any further authentication. The simplicity of the cryptocurrency claim exposes the vulnerability of information. The undetected and anonymous characteristics severely affect digital financial security. In ENISA reports, 5 of 8 prime cyber threats involve electronic transactions, while Cryptocurrency allows unlawful transactions beyond monitoring [16].

Furthermore, the volatility of Cryptocurrency affects financial stability seriously. Via strategic short selling and long position, the price gap could produce significant value, which laundry the money without regulations [17]. Meanwhile, Mining, which is cryptocurrency production, requires consistent massive computing. The computing process consumes considerable electricity and computing devices. According to the statistics, in 2022, the price of Graphic Process Units increased by an average of 30% due to the shortage of demand caused by Mining. Another study shows the massive electricity consumption of Mining: Monero Mining, one of the biggest global mining

companies, is estimated to have consumed 645.62 GWh of electricity in April of 2018, which allows one million tons of water to heat for eight minutes [18].

Therefore, further regulation of Mining and Cryptocurrency is necessary. The European Parliament invests in building the connection between crypto-assets and the traditional financial market to enhance the regulation of the cashing market of the cryptocurrency market [19]. By amplifying the digital security of traditional markets and transactions and limiting the versatility of Cryptocurrency, the government can build a "firewall" surrounding the crypto-market, which could reduce the unlawful activities involved [20].

6. Conclusion

With the progression of technology and algorithms, digital transformation emerges to optimize public financial activities and shift individuals' financial conceptions. However, the continuously evolving systems and the ever-emerging risks coexist. Digital transformation is always related to emerging security risks and regulation deflection. As the financial industry embraces the digital age, robust cybersecurity, and maintaining the financial ecosystem, traditional institutions become paramount in safeguarding sensitive information, ensuring trust, and mitigating potential risks. Meanwhile, it is a crucial, consistent subject for the government to patch risk vulnerabilities, ensuring the progression and stability of the market.

As financial institutions and individuals traverse the digital realm, the imperative lies in fortifying cybersecurity measures to safeguard against potential threats. The relentless pursuit of innovation necessitates a parallel commitment to resilience, ensuring the financial ecosystem remains impervious to malicious activities. Regulatory frameworks play a crucial role in defining the boundaries within which digital transformations unfold. Governments, as stewards of the economic landscape, bear the responsibility of enacting and enforcing policies that not only foster innovation but also establish a robust foundation for secure financial operations. Striking a delicate balance between progress and security is essential to sustain the benefits of digital transformation, fostering a financial landscape that is not only advanced but also secure and trustworthy.

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