Financial Technologies and Applications

Fintech, an abbreviation for financial technology, is one of the driving disruptive innovations in the area of finance. In general, it seeks to reshape how the financial services industry structures, provisions, and captures customers’ demands. It has made transformative inroads in banking, insurance, investment management, securities, and other financial sectors. Fifty percent of financial consumers worldwide use at least one fintech application. Furthermore, China and India, with usage rates of 84 percent and 77 percent respectively, lead the world in terms of rapid fintech adaptation by country. As developers and financial institutions relentlessly seek to harness new technologies, they tend to create new and disruptive business models that offer added value. Figure 1 highlights some of the key technologies and new business models, and the critical value they contribute.

Figure 1. Fintech trends and opportunities.

Early instances of fintech as a means of improving the financial sector can be traced to Europe in the 1600s, where financial consortia helped spark the Industrial Revolution. As a means of building global financial interconnectivity, telegraphs and improved telecommunications capabilities were adopted in the late 1800s. By 1967, simple calculators and ATMs ushered in a new digital era for fintech. Computer systems became a pervasive driver for expanding and

As technology continues to hasten processes and broaden the operating domain of financial institutions, it challenges the best practices that have evolved over the years in the financial world. To better appreciate these challenges, we provide a glossary of some of the terms necessary to comprehend the broad range of fintech initiatives that are increasingly cropping up worldwide, often fueled by well-capitalized and aggressive startups.

**Bitcoin**: the most popular of more than 600 available variations of cryptocurrency. Its checkered history and widely fluctuating value continue to generate uncertainty.

**Blockchain**: a distributed ledger technology (DLT) that underlies most variations of cryptocurrency. Blockchain is beginning to gain legitimacy in industries where transactions require validation, including insurance, securities, and contracts.

**Cryptocurrency**: a decentralized digital currency using encryption and blockchain technologies to protect and validate transactions apart from a central authority.

**Disruptive innovation**: a form of innovation that challenges regulatory activities or other operational aspects of an industry, forcing constructive change.

**Ethereum**: a form of blockchain whose design supports decentralized applications.

**Financial inclusion**: the application of fintech solutions that reach the unbanked or underbanked segments of a developing market.

**Initial coin offering**: a means of selling startup cryptocurrencies to investors, typically using crowdfunding techniques.

**InsurTech**: insurance technology; seeks to simplify the insurance industry while improving its efficiency by focusing on disruptive innovation.

**Open banking**: a movement to harness APIs to connect traditional financial institutions, third-party providers (TPPs), and end users in a network, often via mobile apps.

**RegTech**: regulatory technology; involves harnessing advanced technologies such as artificial intelligence (AI) or machine learning to streamline financial compliance rules. Key aspects include anti-money laundering (AML) and know your customer (KYC) identification and verification.

**Robo-advisors**: algorithm-driven automated investment advisors intended to reduce the role of human investment advisors.

**Smart contracts**: automated contract execution tools often employing ethereum for scripting and blockchain for execution.

**Unbanked/underbanked**: a segment of society that lacks adequate access to banking services which might benefit from fintech apps.

**MODERN CHALLENGES AND OPPORTUNITIES**

According to a World Economic Forum (WEF) report, fintech engages six core functions that typically comprise traditional finance services: payments, insurance, deposit and lending, capitalization, investment management, and market provisioning. Each one of these has distinct fintech appeal and yet presents significant challenges to the continued emergence of fintech.

In the realm of payments, fintech is challenged to provide more competitive offerings to consumers by making payment processes more straightforward. Mobile payments, streamlined payments, integrated billing, and next-generation security represent the key disruptive trends in the payment area.
The emergence of distinct aggregators that can differentiate traditional insurance sales channels might serve to better cement the relationship between the insurance companies and their customers. Distribution channels, the notion of a sharing economy, self-driving cars, and third-party capital are the key disruptive innovations that reinforce insurance disaggregation. Challenges for better facilitating InsurTech will ultimately engage smarter and cheaper sensors, wearables, the IoT, and other standardized platforms.

The financial crisis of 2008 turned out to be a crucial turning point for fintech. Post-crisis, traditional financial intermediaries rigorously scrutinized lending practices to better control the credit risk. This practice resulted in those with lower-credit ratings becoming unable to meet lender-funding requirements to obtain traditional loans. The emergence of alternative lending mechanisms, such as peer-to-peer (P2P) lending, virtual banking 2.0, mobile banking, smart contracts, and open banking APIs all serve to offer additional alternatives to customers. At the same time, these disruptive technologies challenge traditional institutions by directly influencing customers’ expectations.

Financial institutions are now also forced to reevaluate traditional methods of fundraising in light of fintech. Start-ups and mid-tier companies now enjoy an advantage in the operational planning and credit-evaluation processes. The emergence of alternative online financing platforms, such as equity crowd funding, expand the capital-raising pipeline for these new business ventures. As a result, popularity of these fintech tools has increased among various entrepreneurs.

After the 2008 financial crisis, many financial clients could no longer trust human wealth-management and financial advisors. Robo-advisor services, social trading platforms, and innovative retail algorithmic trading provide sophisticated and customer-friendly wealth-management tools. These tools, often in the form of mobile apps, are becoming more readily accessible, less expensive, and more reliable than their human counterparts. These technologies are becoming a force in serving investors in an increasingly dynamic and fast-paced marketplace.

Smarter mechanized systems to support market provisioning promise to enhance transaction accuracy and precision. To this end, machine-accessible data, AI, machine learning, and big data are becoming the main drivers for algorithmic trading. In theory, these tools promise to provide smarter and faster responses.

While all six areas deal with innovation and new technologies, it is perhaps more important to note that as fintech continues to gain momentum, it continually challenges existing business models. Over time, fintech might significantly change long-held business practices. With this comes the promise of more sophisticated, smarter, and faster tools. But in an era of increasingly unconstrained cyberattacks, these tools can also lead to fraud, permit predatory practices, and present significant affronts to security and privacy. Carefully validated RegTech will play an increasingly important role in a world where transaction rates long ago outstripped human ability to perceive rapidly emerging trends.

### RELEVANT FINTECH TECHNOLOGIES

Fintech ultimately aims to streamline the efficiency of the financial industry through continual adoption of modern IT. AI, machine learning, big data, blockchain, cloud computing, cybersecurity, biometric identification and recognition, the IoT, mobile computing, and social networking all play varying roles in the recent emergence of fintech. Moreover, AI, big data, and blockchain are considered three core technologies to enable fintech to penetrate the Internet and mobile Internet. However, these relatively new elements do impose some significant developmental risks.

One of the major fintech IT shifts is from Internet finance to data finance. Data has always been a core component of finance. In the era of big data, however, finance data is bound to influence...
tightening supervision in such areas as risk pricing and control. Along with big data, AI underlies the future of financial data computation. Financial AI applications focus on deep learning, intelligent analysis, and intelligent decision making. AI is further augmented by big data, cloud computing, intelligent hardware, and blockchain technologies.\(^7\)

The technology behind blockchain—the rather volatile Bitcoin cryptocurrency—already portends enormous impact for start-up companies, initiatives, corporate alliances, and research projects.\(^8\) In practice, blockchain technology does far more than just record monetary transactions. Many new business models in fintech use blockchain-based technology. Blockchains now underlie smart contracts, often working in conjunction with Ethereum (a form of blockchain whose design supports decentralized applications). For example, blockchain technology has been harnessed to track the state of healthcare provider licensees to simplify health insurance and yield smarter, more verifiable healthcare services. Blockchain also offers a potential use for insurers in providing new insurance products, increasing the effectiveness to manage fraud detection and pricing, and reducing administrative overhead.\(^9\)

To gain a competitive advantage, the finance industry no longer focuses on Internet traffic or the flow of data across the Internet. In true evolutionary fashion, fintech is shifting from flow-oriented to technology-centric. For this reason, IT is beginning to drive a new phase of technological innovations, which in turn have led to novel business models within the finance industry. For instance, technology enhances fintech operations by driving detailed refinements and increasing modularity. These trends lead to better customer accessibility, comprehensive anti-fraud capabilities, and sound data-risk-control mechanisms. Importantly, they also yield much-needed reduction of cost, both in risk reduction and acquisition.

As digitalization continues to expand, big data analytics, cloud computing, and fintech collaboration will most likely become the short-term considerations for fintech developers. For the longer term, disruptive innovations in AI and machine learning automation, cryptography, blockchain, and quantum computing will likely become the ultimate fintech differentiators.\(^10\) With each, however, come immense ethical challenges yet to be fully recognized, much less resolved.

**INNOVATIVE BUSINESS MODELS**

Fintech often yields disruptive innovation in existing business models. New payment types are emerging with the development of P2P transfers and cryptographic protocols. These developments allow new procedures to evolve. Unlike traditional centralized currency-clearing mechanisms, decentralized currencies, cryptocurrency, and mobile money (such as M-Pesa in Africa) generate entirely new competitive pressures. These new payment methods force existing financial institutions—which rely on traditionally high exchange rates—to rethink their strategies. Furthermore, payment apps such as Venmo and Dinngo offer free digital wallets to allow users to make and share payments with peers and friends. These app payments occur in fun, social, inexpensive, and straightforward ways. In so doing, they tend to support the unbanked or underbanked.

The services provided by a single traditional financial entity can be decomposed into numerous fintech business activities. Fintech tends to dismantle finance business processes to associate their components, often via linked fintech app users. Thus, fintech IT is evolving from an intermediation role to encompass core financial services without the middlemen. In so doing, single business types tend to emerge from larger interconnected industrial chains. This fintech focus, aimed at financial disintermediation, seeks to eliminate a need for financial intermediaries such as banks, brokers, or finance houses. Rather, the pipeline between fund suppliers, such as savers or investors, and the users of funds, such as borrowers or start-ups, is often far more direct when fintech is applied. Disintermediation appears to gradually become a steering influence in
the liberalization of the global financial industry through enabling radically modified business strategies.

The emergence of network information aggregation platforms (aggregators) will streamline past practice in the insurance business, where the company and customer relationship is based on small, personalized commercial insurance sales pipelines. The emergence of online insurance marketplaces and risk homogenization, however, will force irresistible changes in insurers’ sales strategies. For example, low-cost, socially responsible robo-advisors now provide online, automated portfolio-management services. This practice helps people understand their options and make the best possible decisions without requiring a human advisor. No doubt, more advanced robo-advisors will be required to assess and resolve more complex financial situations. Global analytics technology, however, might further increase transparency in complex systems and make financial market data more easily accessible. This, in turn, might lead to more relevant, powerful, and feasible investment decisions.

VALUE CREATION

Investments in fintech companies worldwide have already exceeded $4,256,202 million in 2018. Additionally, the global transaction value is expected to reach $7,971,957 million in 2022, with an annual growth rate of 17 percent (www.statista.com/outlook/295/100/fintech/worldwide). Gartner reports that the business value-add of blockchain will grow to more than $176 billion by 2025, and could exceed $3.1 trillion by 2030.

The recent ascension of fintech has begun to create value, which fuels further development of the financial industry itself. One of the key added fintech values resolves the bottlenecks surrounding developers’ monetary flow. Fintech payment systems serve to enhance and advance a global expansion and development strategy.

Fintech can enable easier and faster payment transactions, which bypass currency laws and regulations that exist in different countries. P2P transfer technology might also allow stakeholders to bypass the traditional intermediaries and transfer money directly to accounts. This process is quick and relatively straightforward with only nominal fees. Indeed, P2P promises to render a valuable service with fairness and transparency.

Unlike traditional banks, which rely on the design of their larger-scale products to attract customers, fintech has shifted to cater to the preferences of its consumers for streamlined and modularized products and services. As customers increase their dependence on and trust in fintech, IT might be employed to provide increasingly convenient low-cost digitalized apps. As a result, fintech will have improved the customer experience, which becomes one of its most significant value creations.

IN THIS ISSUE

This special issue of *IT Professional* presents emergent fintech trends and examines promising future developments, critical challenges and issues, innovative approaches and novel solutions, and new financial applications. After a careful and thorough screening and review process, the following three articles were selected for inclusion in this special issue.

In “The Use of Big Data Analytics to Predict the Foreign Exchange Rate based on Public Media: A Machine-Learning Experiment,” Rua-Huan Tsaih, Biing-Shen Kuo, Tzu-Hsiang Lin, and Che-Chuan Hsu explore the hypothesis that the application of big data analytics (BDA) technology with machine-learning modeling will yield relevant information in new media (news websites, forums, and social media) and can predict the movement of
exchange rates. This article probes the proposed BDA mechanism, which is capable of generating a prediction rate of more than 50 percent, suggesting its potential to yield additional profits for traditional trading rules. It offers a fintech arrangement that can potentially compete in the world of market efficiency.

In “How to Analyze Data from the Unlisted but Rich Firms: From the Perspective of Data and Analysis,” Russell Newman, Victor Chang, Robert J. Walters, and Gary Wills describe the techniques necessary to gather and analyze pre-processing data for unlisted but rich firms such as venture capitalist firms. They also demonstrate how to query and analyze using both datastreams and SQL.

Finally, in “Evolving Payments Landscape: Technological Innovation in Payment Systems,” Filip Caron identifies the distinct segments of the current payment landscape with inherently different characteristics and risk profiles. The article associates different business requirements with different payment market segments, distills trends and technological challenges from the blueprints of future payment systems and regulatory frameworks, and identifies nimble technology firms that are challenging the traditional banks.

FUTURE NEEDS

Because of fintech’s popularity and rapid growth (and unrelenting cybersecurity threats), consumer protection and fraud protection mechanism are urgent needs. In this era of advanced fintech development, governmental policies and regulations must also keep pace with economic development in all markets, but particularly in the rapidly emerging markets of Asia and Africa. These regions have an advantage as they tend to lack a backlog of old technologies to overcome. At the same time, all societies responsible for introducing nimble but potentially dangerous mobile apps to the world must take strong ethical considerations when creating the technologies underlying fintech. We hope you enjoy this special issue on fintech and we welcome your feedback.

REFERENCES


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