CHAPTER 22

Sustainability in the Banking Industry Through Technological Transformation

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Introduction

The chapter presents technological revolution in the banking sector. Digital transformation of banking is the only pathway to regain the sustainability of the incumbent players. The chapter addresses the drivers and opportunities of digitization of the banking industry during the systemic disruption (affecting the whole system). Challenges for innovation diffusion and adaptation to disruptive technologies are dramatically changing the financial market infrastructure and creating new risks in the evolving financial services open ecosystem.

As a matured industry, banking exhibits relatively low growth with a widening gap between the top banks and the rest of the sector.

The digitalization imperative followed deregulation, globalization, and consolidation phase, rewarding the global and multi-local presence with streamlined services. Highly competitive banking industry is driven by technically savvy customer, very demanding regulatory compliance, efficiency, and speed/time pressure from the booming innovative nonbank offer. The banking back office, including risk management and internal controls, needs to be enhanced with much more creativity to support customer facing digitalized operations in the conditions of increasing uncertainty.

The chapter addresses the reasons of digital investments underperformance in many banks and the merits of successful approaches to IT investments in banking. Lagging institutions, resisting digital innovation will face profit

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erosion and will follow a spiral of decline similar to other failures observed in the technologically intensive industries.

The chapter covers new technologies and trends predicted in the banking sector with recommended strategies for sustained growth of banking organizations. It indicates new opportunities for development of the financial services offering, efficiencies, and convenience through automation of core banking functions, connection, operation, and processes in the value chain creation. The competitive collaboration with the Fintech sector will result in reinventing more productive business models, a new market structure, and dynamics. The digital disruption, as the inflection point, will involve developing new roles of banking employees (and substantial displacement of human capital) with application of artificial intelligence (AI) in the bionic transformation.

The social and international perspective of cross-country comparisons (recognizing the technology gap and financial inclusion of the bottom of the customers pyramid) supplements this futuristic, but a highly probable view of the banking industry. A more efficient and resilient financial sector delivering value to customers and society is expected to emerge.

The chapter discusses new identified risks associated with the digital revolution in banking related to cybersecurity, privacy, a third party risk, and outside banking regulatory supervision. The challenges of harmonization to deploy technologies, such as the distributed ledger technology (DLT) (a database that is consensually shared and synchronized across multiple sites, institutions, or geographies), in a blockchain infrastructure in a multi-party, globalized network environment will lead to a condensed financial-intermediation system with streamlined, direct, and virtual delivery of financial services. The disintegration of trading patterns, resulting from innovation and lower trading costs through competition among matching platforms, may lead to reduced market quality while transferring more power to the largest financial providers.

The PESTLE framework is applied for the presentation of the key factors driving the digital revolution in financial serviced identified in the literature review and focused on technological, legal, political, and socio-economic factors. The tripod approach is followed for presenting the research results covering the future evolution of the banking sector organized into the following sections: resource-based view, industry analysis, and institutional analysis.

Literature Review

Technological Factors Bringing Inflection Point in the Financial Industry

Distributed Ledger Technology (DLT) Innovation

Distributed ledger technology (DLT) with blockchain form had the largest disruptive effect in the field of market infrastructure causing possible disintermediation of some market players in the process of market fragmentation and

creation of silos. With blockchain technology, participants in the system can transact bilaterally without a third-party intermediary. The trust is established instead by the shared distributed, decentralized ledger, and the system of validation through consensus (Bullmann and Pinna 2017; Cohen et al. 2016; Tranquillini 2016; Workie and Jain 2017).

This database technology is used to share the management of information among multiple participants in a network without reconciliation between financial institutions. The stored information is instantly and independently updated by multiple participants and protected via encrypted digital signatures. It increases the resilience of the system and its ability to recover from disruptions.

DLT as critical innovation can foster collaboration with stakeholders across markets and jurisdictions to develop sound technological, legal, governance, functional, and operational cross-border standards to make financial markets more efficient and safe. DLT platform can improve and enhance experience for consumers, allowing new affordable and accessible financial services (offered by partners) and improving functionality of general ledger accounting, by tying it to digital cryptography and redefining process and roles of various market players (Workie and Jain 2017). However, open banking platforms create network market vulnerabilities with rent appropriation threats (Gomber et al. 2018; Mager 2019; Tranquillini 2016).

The direct interaction between issuers and investors on a distributed ledger will reduce importance of regulated intermediary financial institutions. Concerns for safety and sustainability of such a market architecture put the financially dominant and innovative banks to cocreate and manage the emerging DLT-based financial ecosystem with collaboration of Fintech partners during the emergence of disruptive platforms to streamline the business (Campenon 2016; Cohen et al. 2016; Workie and Jain 2017; Panetta et al. 2017; Tranquillini 2016).

Banks recognize the efficiencies of blockchain technology to reduce counterparty risk or capital held against unsettled trades, limit human error in matching trades, limit the professionals needed for administrative and settlement functions, and expedite the settlement of trades. One-stop-shop, transaction monitoring and the combination of traditional credit and transaction data in one location could support credit scoring and fraud protection. It could pose a risk for full-set of data comprised by unauthorized breach. (Cohen et al. 2016; Gomber et al. 2018; Kiljan et al. 2017; Workie and Jain 2017). Information sharing among institutions can strengthen the maturity of the participating partners' cybersecurity programs against cyber-attacks (Korte 2017).

The most promising advantage of DLT for financial industry, driving top-line revenue growth, is the development of new products and services (delivery modes) by utilizing smart contracts to replicate (or replace) conventional legal agreements. It will result from applications to financial products, including commercial paper notes, derivative instruments, and asset backed securities (ABS).

Donald (2018) explains the evolution of securities trading shaped by law and technology. Securities trading migrated from private networks to public forums and now will be returning to private networks. The disintegration of securities trading can reduce market quality for most of the stakeholders while increasing the power of the largest institutions limiting market access.

Artificial Intelligence (AI) Application

AI-based cognitive computing utilizing vast and versatile data and information sources might become the financial industry's biggest disruptor. They can improve evidence-based decision making by continually learning about the market from each transaction (Ehrenfeld 2017).

Application of robotics and cognitive automation in banking enabling faster processing, handling higher volumes and reducing errors, are next industrial revolution. They bring negative structural challenges such as process fragmentation requiring front-to-back process streamlining, redesigning, or even reengineering along with automation and dramatic employment shifts. Those challenges must be addressed with the right operating model, governance, opportunity qualification methods, and infrastructure. To reimagine processes for greater efficiencies and control, many issues should be resolved: quality of data, validation process with some flexibility, unstructured communication, legacy systems, and massive employee retraining for advanced skills-jobs (Hegde et al. 2017; Krishna 2016).

Mieszala (2015) considers a triple revolution via increasing penetration of digital technologies in banking. First, an industrial revolution with new opportunities for growth and cost reduction resulting from the automation of core banking functions-connections with clients and between employees, innovation, processing of operations, and decision making. Then, a market revolution initiated by specialized new entrants such as Fintech lenders, disintegrating value chains, reinventing their business models, and fundamentally transforming the market structure and dynamics. Finally, a managerial revolution, as digital disruption requiring new skills and mindsets among employees, completes the process.

A New Form of Money

A new form of digital money—programmable smart money—originated the acceleration of automated electronic payments in the cashless society. The new API technologies changed the financial services industry by their distributed and decentralizing nature. Technological evolution of the financial environment led to the creation of multiple cryptocurrencies, which started with the disruption of the post-1971 world of fiat currencies. The token-based transactions are the advent a new era of ambient accountability, where the technological architecture provides for constant verification and validation. Banks would be enticed to join this trend by embracing the digital money and digital

identity technologies for private money creation as cost-effective and desirable by all market participants. Central banks have to enable this radical change with a permitting regulatory framework and a considered seigniorage issue for money creation. The transformational expansion of cryptocurrencies will promote innovation in the wider economy while servicing complex transactions with substantial information contents transfer, reduction of concentration of liquidity and credit risk, and financial inclusion in the economy. Concerns of political control, and tracking tax evasion, money laundering, and bribery remain (Birch 2018; Gomber et al. 2018).

Legal and Political Factors Opening the Market for New Technologically Armed Competition

Market Entry Barriers Relaxed

Regulations removing competitive barriers help new entrants (Fintech firms) who propel the revolution in the industry by complementary innovations with progress enhancing effectiveness of another, promoting a new business model with the reduced need for intermediaries. In Europe, the second Payment Services Directive (PSD2) enabled new types of financial services companies: Account Information Service Providers (AISP) and Payment Initiation Service Providers (PISP). Banks were forced to allow approved third parties access customer data and payment systems (Docherty 2018; Salmony 2018).

Fintech revolution inherent in the sharing economy affects financial services due to major improvements in efficiency, customer centricity, and informedness, process disruptions, and use of social media. Fintech providers leverage technology to create stakeholder value associated with an expanding range of financial transaction payments and charitable giving, cryptocurrencies, blockchain, FX (foreign exchange) and cross-border payment, lending and deposit services, peer-to-peer (P2P) lending and crowd-funding, investments, financial markets, trading, risk management, and robo-advisory.

Providing deposit accounts, such as checking and savings accounts, and giving retail and commercial customers access to their funds (requiring asset/liability management and banks leverage) remain the most fundamental and pervasive banking functions due to legal protection, deposit insurance, and risk-incurring time transformation of money.

As open banking and interinstitutional APIs (application programming interface) enter the mainstream, the deposit services market will face substantial Fintech-driven disruption. With approaching maturity of the Fintech sector, advocated expansion into capital markets, and progressing customer intelligence as a key driver of financial firm profitability, regulators might engage in more oversight (Gomber et al. 2018).

Bigtech companies such as Apple, Google, Amazon, Facebook, and PayPal have technology, capital to invest, and customer franchises into which to market financial products (Viceira et al. 2018; Docherty 2018). Incumbent banks

have the legacy network to defend and experience the pressure to adapt to the different competitive environment. Banks need to address the technology platform-driven disruption and threat of obsolescence caused by the new competition created by adoption of modern technologies. Financial institutions and Fintech start-ups sustaining systematic innovation can be mutually supportive and complementary in collaborative strategies building customer-centric business models not competitors in the same market segment (Gomber et al. 2018).

Fintech providers as innovators can increase benefits from the diffusion of the new technology from the external adopters by pursuing collaboration with banks when the systematic characteristics of the innovation process change irreversibly. It is evidenced on the pattern of innovation diffusion because of using multi-party integration needs/solutions observed in the banking industry (Wonglimpiyarat 2017).

Regulatory and Compliance Pressure Increased Requiring Risk Management With New Technologies

Following new capital regulations from the Basel Committee and an overhaul of loan accounting standards, banks facing strategic risks need to embrace new breakthrough technologies to preserve short-term shareholder value while maintaining long-term competitiveness and viability (Docherty 2018; Griffoli 2017; Folwarski 2018).

Banking and securities industry risk management regulations resulted in transformational change with impact on the underlying data and technology infrastructure. Critical technology and data management components were deployed with support of external vendors to assist with regulatory compliance, affecting data sourcing, data processing and retention, data analytics and reporting, data management, governance and control synchronized with policies, standards, procedures, and documentation dealing with complex global regulations (Krishna 2016; Becker and Buchkremer 2018).

These technologies (such as ontologies, coupled with artificial intelligence and machine learning (ML)) help process, federate, and integrate unstructured data (text, voice, video) and structured data from siloed databases in and across financial institutions (Butler and Brooks 2017).

Regtech semantic-technologies-based solutions (the management of regulatory processes within the financial industry through technology) provide support for better decision-making because they originate from heterogeneous and fragmented GRC (Governance, Risk Management, and Compliance) solutions recognizing the need for a holistic, integrative approach. Regtech providers, as vital robust partners for the experimenting financial industry, utilize a combination of a variety of technologies. Regtech industry supports overarching framework to integrate fragmented initiatives in financial institutions. Regtech, as a third party subject matter specialist, plays a significant role for all stakeholders in collaboration, governance, standards, and market practice harmonization to implement successfully new Fintech solutions in a multi-party,

globalized network environment (Ehrenfeld 2017; Gomber et al. 2018; Smith 2018; van der Westhuizen 2016; Krishna 2016).

The well-managed data benefit the business by improving customer analysis, risk management, compliance, portfolio management and marketing, reengineerd processes to eliminate waste, designed better products and services, improved relationships with customers, and pursued more effective distribution channels to generate business (Smith 2018).

Socio-Economic Factors Expanding the Market for Financial Services

Financial Inclusion of Underserved Populations

The entry of Fintech providers and the use of robo-advisers by traditional financial services companies offering mass-market financial advice demonstrate a new trend described as a blend of new-market and low-end disruption with attractive low-cost value proposition. A new class of wealth management advice providers is attracted by a sizable underserved population, similarly as initially Fintech firms were offering payments and lending after the financial crisis of 2008 (Viceira et al. 2018; Kansal and Chaganti 2018; Buchak et al. 2018).

According to Jagtiani and Lemieux (2018), Fintech firms' consumer lending activities penetrated areas underserved by traditional banks, such as in highly concentrated markets, areas with fewer bank branches per capita, and where the local economy was not performing well.

Manif and Marsh (2017) and Noronha and Kumar (2019) explain how digital revolution addresses financial inclusion for low-income underbanked populations. DLT technology offered by Fintech reduces costs and increases access points, and offers instant cash, settlement, and remittance for consumers without a checking or saving accounts relying on check cashing services. DLT's real-time transfer ability improves check processing, drawing unbanked consumers to banks in the process if they operate on the shared platform. The unbanked households use their mobile devices as an access point to other Internet-based services such as mobile payment services. The smartphone dependency is higher among low-income, minority, and less-educated populations more likely to be underbanked or unbanked, but exhibiting high rates of mobile phone ownership and concerns about privacy. Customer satisfaction in using financial services via various delivery channels (e-banking includes ATM, net banking, mobile banking, and phone banking) depends on ease of use, conservation of time, convenience, privacy, accuracy, and servicing most needs (Rani and Rani 2018).

Perception of Trust and Digital Privacy

Trust is the most critical element in the decision of purchasing financial advice. Century-old banks with tarnished reputation are not considered more credible than exciting Fintech startups (Viceira et al. 2018; Docherty 2018; Gomber et al. 2018; Manif and Marsh 2017; Trieu et al. 2019). Consumers are

comfortable with online interactions and demonstrate a strong preference for digital. They favorably choose Fintech and Bigtech providers' business models with recurring transactions, as prepared meal purchases or gasoline fill-ups turned into loyalty propositions with support of apps adding value by organizing history.

Digital privacy is the foundation of consumer trust. It depends on business information security and governance controls in the digital services. Security solutions for digital privacy protection and access validation include multifactor authentication, security tokens, biometrics, and access control lists. Data privacy concerns or a breach of security has damaging implications for customers and business. Hence, the technology, policies, and processes used to store, transmit, and control access to enterprise information are critical (Rice and Sussan 2016).

Salmony (2018) recommends the use of intelligent data-driven authentication available in new digital technologies for smart digital identification to replace the current dependence on government-issued documents, faxes/utility bills, user ID/passwords, and rigid two-factor procedures. The modern 3SPP identity solutions are secure, simple-to-use, scalable, private, and pervasive according to the expanded akronym. The model connects many current silos of organizations providing attributes across multiple participating parties employing an open four-corner model, with banks playing as trusted partner, the central role, instead of today's point-to-point interconnections. It offers better protection against massive cyber breaches and identity frauds. Users experience would be enhanced by reduction of countless passwords, registration procedures, poor online acceptance, and high fraud costs. Pseudonymity, substituting true personal identity, is convenient, saves costs, and improves privacy, but requires attribute management in the new open application programming interface (API) network economy. Providing identity services is a new future business opportunity for banks to be offered to corporates (including Fintech), governments, and online services when the IoT (the Internet of Things) devices and mobile apps needing identification will explode in volumes.

Considering the capabilities and limitations of DLT technologies and roboadvisors hoped to be a foundation for solving major problems faced by financial institutions, regulators and Fintech companies will need to continue working in collaboration to avoid fragmented innovation. The beneficial disruption in automation processing will only occur when all who participate agree to find solutions benefiting all participants (Ehrenfeld 2017).

Innovation Driving Efficiency

The customer acquisition costs remain high, because of the critical nature of the scale of the business, while customer retention became more difficult (Gomber et al. 2018). With the existing significant client base and data for data mining, banks as the incumbent players could capitalize on the opportunity for automated wealth management services in collaboration with Fintech firms offering technological solutions. Banks guard their greatest legacy assets and

fear cannibalization of their high-margin business and a brand/trust gap (Folwarski 2018).

The effectiveness of banking technology investments depends on the support for transition efforts received from transformational leaders, commitment to change successfully overcoming resistance, and diffusion of the innovation (Cingilloglu 2017; Messenböck et al. 2017; Ardizzi et al. 2019).

Banks consider various strategies in the digital revolution: build, buy, or partner, depending on the cost-efficiency and control of technology in capturing the market. Fintech providers are attracted to collaborate with banks to get access to a customer base. Banks are taking cautious bets with Fintech firms to best position themselves in the instant delivery for customer satisfaction. Full acquisition is not often considered by banks because banks are looking for strategic gaps to fill for revenue growth with mature technologies ready to apply for new products or new market segments. There are challenges in potential acquisitions such as costs/pricing with intellectual property diligence and integration challenges due to cultural differences and growth-oriented Fintech versus bottom-line performance-focused banks. There is a natural strategic fit between banks and Fintech firms, facing the competition from Bigtech companies (McCormick 2018).

Fintech providers as parent companies of smaller banks might gain an unfair advantage over their competitors, misguide their creditors, or limit their liabilities by benefitting from the federal subsidies given to the banking industry. Fintech-owned bank activities could pose a significant risk to the federal safety net. Therefore, it would be preferable to have both Fintech industry as well as maintaining a safe and sound banking system (Oney 2018).

Methodology

The study was conducted in the meta-review format for reconciliation of dominant patterns and forecasts with recognition of notable differences. It was based on reports, analyses, and data from leading research tanks and advisory, consulting firms, and industry experts, focused on financial services technology (BCG, McKinsey, PWC, KPMG, CFTE, GPS Citibank, BNY Mellon, Unisys Corporation, Celent, CBInsights, Deloitte, IDC Financial Insights, FDIC CFR).

It includes interdisciplinary and cross-industry analysis (financial sector, Fintech firms, Regtech firms, IT) with a global perspective and regional differences. It incorporates relevant functional issues related to IT, finance and economics, strategy and organizations, marketing, statistics and data science, operations management and management science, and computer science.

Resource-Based View of the Future Banking

Expected Employment Shits and Substitution in Banking

By 2030, large banks will reduce the total employment by 30–50% of the current number while shifting the workforce to operations and technology, constituting 50% of the bank personnel. It will reduce the cost-income ratio to 30% from current average of 60% leading to significant gains in the return on equity (ROE) (Ghose et al. 2019; Deloitte 2019a; Skinner 2018; Dupas et al. 2017).

The biggest layoffs at Wall Street are expected in asset management (90K), securities service (58K), sales and trading (45K), private banking and wealth management (24K), and trading and clearing venues (15K) by deployment of artificial intelligence and blockchain (Skinner 2018), whereas only an increase of 24K is expected in technology and data hiring.

Next, there will be dramatic shifts in banks' employment by 2039, mostly reduction of back-office jobs by 20% cut from the current 38% employment in the banking sector and strong growth in the demand for software developers and computer system analysts (McKinsey 2018).

Banks hire talent from competitors and are expected to source out project-based needs to gig-based employees, up to 15–20% of labor force in next five years (Ghose et al. 2019; PWC 2019; Morel et al. 2018).

Expected Skyrocketing Spending Patterns on Technology

The rankings of the digital leaders among banks are aligned with banks spending on technological innovations. Twelve of the 15 largest banks, including JPMorgan Chase, recorded an increase in their operational budgets from 2016 to 2017, and budgeted $9.5 billion annually for technology in 2016 and 2017, and an increase to $10.8 billion in 2018. Bank of America set the bar higher with an annual global technology and operations budget of nearly $16 billion with Citigroup Inc. spending roughly $8 billion on technology and Wells Fargo $9 billion. The sum of bank IT spending across North America, Europe, Asia-Pacific, and Latin America is expected to increase by 4.2% compounded annual growth rate from 2018 to 2021 to the total of $296.5 billion (Garcia 2018; Shevlin 2019).

The gigantic IT spending budgets of the mega IT bank players evidence a growing gap between the largest and smallest banks, reflecting what they can afford to invest to develop new technologies. Smaller banks are falling behind because regional institutions suffer from a competitive disadvantage. Although, as a percentage of assets, IT spending at four of the largest regional banks (US Bank, PNC, BB&T, and KeyBank) is slightly higher than it is at the four mega-banks (JPMorgan Chase, Bank of America, Wells Fargo, and Citibank), 0.51% as compared with 0.44% respectively. The widening gap is even more significant for smaller players. Credit unions' spending on technology, as a percent of assets, is behind the mega- and regional banks, with the median IT spending among credit unions of 0.42%. They spent about $6 billion in total on IT in

2018, just a little more than half of what JPMorgan Chase spent by itself that year, whereas mid-size banks ($500 million to $50 billion in assets) spent 0.22% of assets on IT in 2017 (Shevlin 2019; Nichols 2019; Dupas et al. 2017).

At most advanced banks, 60% of all transactions are conducted digitally via smartphone or computer, following the first imperative of digitizing for bank cost reduction and next, digitizing for customer value increase. To attract more of the lagging revenue through digital channels' adoption, banks need to pursue ecosystem approach and invest in Fintech. In 2017, banks increased their participation in the funding rounds for retail banking startups to 71%, as compared with only 20% in the 2013 funding for Fintech firms (Desmangles et al. 2018; PWC 2019).

The most active US bank investors in Fintech companies (by the number of portfolio companies) are Goldman Sachs, Citigroup, and JPMorgan Chase. They focused on technologies supporting real estate, data analytics, and payments & settlement, complementing their own digital banks development. Data analytics category consists of startups leveraging AI and ML. Citigroup engaged in four blockchain, three capital markets, and three payments & settlement startups since 2017 related to its own in-house bank's larger strategy of building open banking infrastructure. Capital market startups include augmenting or replacing securities issuance, trading, clearance, and operations (CBInsights 2019).

Fintech providers (interested in banking license and access to customers), as mutually beneficial natural fit, can support community banks with agile technology development because community banks lack the necessary personnel to invest in new digital products and are slow in innovation (Hernandez 2018; PWC 2019; Morel et al. 2018; Elder 2016).

Nearly 50% of banks around the world say that their latest digital investments are failing to generate returns greater than the costs of capital. Only a few banks generate significant returns from digitization. Those benchmark banks benefit from consistently harvesting the idle capacity resulting from ongoing digitization while digitizing the front-end customer experience. They capture productivity unlocked in their legacy operations and extend digitization to non-customer-facing operations, such as finance, HR, and other corporate functions. Although they experience efficiency gains through the full, continuous, and disciplined digitation cycle by repeatedly applying created new capabilities to scale out with the flywheel mindset, their primary focus is on improving customer experience. The real gains come from applying digitization as broadly as possible across the organization and from building an ongoing capability for capturing digital value (Baghai et al. 2018).

Successful digital investment results are driven by prioritizing innovations improving customer experience and employee experience at the same time, while increasing revenues and reducing costs (Jain 2017).

Expected Banking Revenue, Profitability Forecasts, and Financial Inclusion
Banks will address new revenue trends based on the wealth-based stratification of the consumer markets with 30–40% of population in the developed societies having no money, displaying only basic transactional banking needs. Another 30–40% of people who have very little money can be served at much lower costs with automated artificial intelligence powered across all financial services. The remaining 20% constituted by affluent high net worth individuals and ultra-high net worth could be provided personal human being-aided attention in the new cost-efficient operating model (Ghose et al. 2019).

To revitalize banking revenue streams, banks can implement analogies from other industries, such as cobranding products (e.g. credit cards) and revenue-sharing arrangements contributing between 10% and 30% of revenue attribution. New opportunities are important to substitute for the expected revenue loss in the range of 10–30% due to digital disruption. Between one-third and one-half of all consumer payment volumes, 17–34% of personal lending volumes, and credit card lending and mortgage volume up to 17%, investments volume up to 34%, and 17–34% of SME lending volume, may be taken over by digital banks, Bigtech, or Fintech firms by 2025. The negative profit impact can be devastating to banks because lending accounts for more than 50% of banks' total risk-adjusted revenues, followed by savings and investments (21%), capital markets (16%), and payments (7%). Personal/SME is the most profitable segment for banks, accounting for nearly 50% of all profits, followed by corporate (35%) and investment banking/markets (20%) (Ghose et al. 2019; Broeders and Khann 2015; Dupas et al. 2017; Baumgärtner et al. 2018).

The market appetite for passive investing and the popularity of open-ended mutual funds and exchange-traded finds (ETFs) increased to 45% of the US market share, 48% in Asia, and even 70% in Japan to support the transition to robo-advisors (McKinsey 2018).

The major revenue growth potential is expected in Asia (8% annually) with also Latin America and the Middle East and Africa experiencing above average prospects. Regional differences are not only the result of different digital transformational strategies but also a response to various macroeconomic conditions, trade flow corridors, labor flexibility, and regulatory changes (Desmangles et al. 2018; Badi et al. 2019; BNY Mellon 2014; PWC 2016; Ghose et al. 2017; Grasshoff et al. 2018b; Allen 2019; Baumgärtner et al. 2018).

Industry Analysis: The Forecasted Strategic Changes

Widening Gap in the Banking Sector
There is already an increasing profitability dispersion between the early market proxies for challenger platform banks in the United States (CWB Bank, CelticBank, and Live Oak Bank) and disadvantaged by the physical network large top-ten banks. ROE (return on equity) multiplier of proxies over the top-ten US banks increased from 2.3 in 2016 to 6.0 in 2017 (Allen 2019).

Further revenue loss for lagging banks and limited ROE improvement will lead to progressing polarization between market winners and losers with top banks already enjoying a big efficiency advantage. Large banks are negatively affected by higher costs, compliance, and structural complexities. Many banks do not have clear digital strategy or lack market-leading digital capabilities undermining their digital readiness (Ghose et al. 2019; Desmangles et al. 2018; Baumgärtner et al. 2018).

Top-ten US banks leaders in digitization are JPMorgan Chase, Bank of America, Citibank, Morgan Stanley, PNC Financial Services Group, Wells Fargo, Goldman Sachs, Bank of New York Mellon, TD Bank, and US Bank. These pioneers were identified in the multifaceted research, rated on working with cutting-edge technology with strong infrastructure, learning and innovating with technology, adopting blockchain and cryptocurrencies, and embracing digital transformation (Ansari 2019; Din 2017).

The top banks recognized by Global Finance Magazine global banks by innovation (in the respective regions) were Bank of America (Global and North America), BNP Paribas (Western Europe), VTB Capital (Central and Eastern Europe), CCB International (Asia-Pacific), BBVA (Latin America), GIB Capital (Middle East), and Rand Merchant Bank (Africa). These banks were 2018 inaugural winners of the Best Bank for New Financial Technology category because they are at the forefront of the financial innovation, leveraging blockchain, artificial intelligence, data analytics, and the Cloud to change the face of banking (Kranc 2018; Morel et al. 2018).

A New Business Model for Banks: Challenges of Open Banking or Connected Banking With Strategic Alliances

As per Salmony (2019), banks have a mixed record in adapting to changes. Banks will have to implement changes driven by unsatisfied customers demanding change, at high expense, under time pressure, under rules laid down by others such as regulators, new competition from Fintech, and new technologically intensive and connected network-based environment while addressing high infrastructure and compliance costs. Banks should become more active, and regain the initiative through smart approaches with instant (real-time) relentlessly client-centric service.

The open shared economy will be much larger, with the banks well positioned to take the biggest share of the benefits. They invest in the open digital infrastructure taking a key role in the collaboration-based model by successfully cherry-picking of partners (PWC 2016; Grealish 2019; Grasshoff et al. 2017; Brackert et al. 2019; Morel et al. 2018; Baumgärtner et al. 2018).

A Platform Virtual Bank

Branch-based banking began its steady decline in the late 1980s with emergence of challengers operating as a branchless Internet-only banking model. Branches were reduced but not eliminated, as part of multichannel strategies pursued by major banks, justified by the demand for deposits. Next, banks will

be hosting and monitoring DLT platforms to enhance customer experience (Gomber et al. 2018; Patel and Brown 2016).

Customer-Oriented Focus

Banks are well positioned to adopt the KYC (Know-Your-Client) approach based on the wealth of data collected for compliance with the anti-money laundering (AML) regulations. The legacy control culture and the internal fragmentation into silos with manual processes reduce operating speed, limit flexibility, increase cost, decrease efficiency, and divert attention from the customer service experience (Ghose et al. 2019; Backbase 2018; Desmangles et al. 2018; PWC 2019; Brackert et al. 2019; Saleh et al. 2017).

Risks and Global Issues

For banks, cybersecurity is not purely a 'technology problem' but a business challenge requiring business ownership and strategy development. From an internal bank issue, cybersecurity will shift the attention to risk to the third-party service providers and connections as banks struggle to manage the complex ecosystem of third-party service providers, and the dependencies they create under strong regulatory pressure (KPMG 2018; Grasshoff et al. 2018a).

The cybersecurity risk will be exacerbated by an increased use of third-party vendors, deployment of evolving, sophisticated and complex technologies, explosive growth of cross-border data exchanges with new markets, increased use of mobile technologies by customers, including the rapid growth of the Internet of Things, and heightened cross-border information security threats. The expected areas of concern include attack surface, perimeter security, privacy protection, and device management. Use of machine learning, big data, data mining, customer analytics, and collaboration within the joint risk-based framework, and digitized risk management can balance customer safety-convenience trade-off, increase efficiency, and reduce processing time (PWC 2016; Grasshoff et al. 2018b; Ivanov 2019).

Institutional Analysis of a New Emerging Market Landscape and Players

There are various strategic pathways dominated by consolidation via M&A and strategic alliances creating convergence. New trends will lead to a completely new arena of banking collaborating intensely with emerging leaders in the financial services (Ghose et al. 2019; BNY Mellon 2014; Alf et al. 2018).

Incumbent Banks Making Strategic Bets

With muted revenue growth of 2% annually and 8–9% average ROE in the period of 2012–2017, global banks need to reinvent themselves quickly and dramatically. Even in the asset management sector, where ROE is much higher than the average in the financial services industry, there is downward pressure on margins and profitability from ETFs and robo-advisors. Although the

capital markets revenue grew 7% from 2016 to 2017, investment banks, after five consecutive years of revenue decline, captured only 33% of total revenue in 2017, down from 48% in 2006 (McKinsey 2018; PWC 2019; Grasshoff et al. 2018b; Allen 2019; Morel et al. 2018).

The incumbent banks will transition into next-generation cloud-native technology platform to eliminate duplication and fragmentation, much beyond just mobile banking, use of big data, and cybersecurity. The internal growth model is based on principles of venture capital and lean startup methodology. It is a new way of thinking for the organization, empowering employees, to build, test, and launch innovative solutions for clients. The deployment of new platform replacement is very risky, expensive, and time-consuming. Deep strategic alliances with tech vendors and Fintech firms will be mutually beneficial, although initially ignored (Ghose et al. 2019; Deloitte 2019a; BNY Mellon 2014; Sella 2017; McKay 2017; Dab et al. 2017; Jain 2017; Kranc 2018; Morel et al. 2018).

APIs are critical for traditional banks (with PSD2). They revolutionized the system giving the lead to Fintech providers. Banks have to take over the initiative for providing controlled access to their open platforms. APIs and access to comprehensive collaborative banking platform provide what customers want—one dashboard of their complete financial life taking fuller advantage of the open network economy (Ghose et al. 2019; Backbase 2018; Morel et al. 2018).

It will be much more beneficial for banks to become a platform company providing access with API for external third parties rather than to attempt to integrate banking into other apps (Ghose et al. 2019; Deloitte 2019c; Desmangles et al. 2018; Bareisis 2019).

Traditional banks have to overcome the attachment to old architecture and some manual processes because it obstructs the deployment of new technological environment, although the old core banking system (CBS) is underlying basic day-to-day functionality. The change requires implementation with concurrent integration, training, reconciliation, and pending compliance. The launch of new stand-alone digital offshoots might be a cautious way to mitigate the risk of transition but can delay the process. Benefits can be derived from learning experience allowing replication or gradual digital migration to the new model for the revolutionary approach using a parent brand name for leverage in areas when trust is needed (Ghose et al. 2019; Deloitte 2019a; PWC 2019).

Incumbent banks have to embrace disruptive technologies driving new platform-based business models like a start-up approach creating an opportunity for deep strategic partnerships with a variety of players offering compelling unique selling propositions (USP) (Ghose et al. 2019; BNY Mellon 2014). It requires a dramatic internal cultural change and openness into strategic partnership with technological providers or leaders in the field (Ghose et al. 2019).

PSD2/Open Banking drives the competition in banking by opening the sector to a variety of players and various forms of collaboration for access to customer and customer data. Banks have a great business opportunity to use big data from their fragmented data pools to transform them into data lakes for

cognitive and personalized banking. Tracking needs exhibited by customers could support eroding loyalty (Ghose et al. 2019; Backbase 2018; Desmangles et al. 2018; BNY Mellon 2014; PWC 2016; McKay 2017; Dab et al. 2017).

Financial inclusion will widen the market enabled by a new low cost-to-serve data-centric digital banking model explained by the ATGIE concept: acquire, transact, generate data, insight, and engage (Ghose et al. 2019).

New global market expansion opportunities for digital offering of financial services are in countries with cash dependency, alternative payment options, underbanked populations, demographics with young, migrating populations, and with regulatory and institutional support for mobile money adoption (Ghose et al. 2019; Trieu et al. 2019; BNY Mellon 2014).

Reimagining of traditional banking involves three-pronged digital strategy encompassing: (1) digital bank targeting mobile-first and mobile-only generation, (2) omni-channel experience with deepening customer engagement, and (3) ecosystem partnerships forging collaborations to widen distribution reach (Ghose et al. 2019). It corresponds to the model of digital platform-based open modular and smart banking with agile processes delivering superior customer value. It requires a quantum leap in the customer-focus providing insight and building relationship in the new-housed, orchestrated ecosystem (Backbase 2018; McKinsey 2018; Deloitte 2019b; PWC 2019; Dab et al. 2017; Morel et al. 2018).

Incumbent banks are expected to expand the use of blockchain, RPA (Robotic Process Automation), business process management (BPM) and AI technologies (including image recognition, optical character recognition—OCR, natural-language processing—NLP, voice recognition), and better data management in both the front and back offices in transaction banking. Standardization of processes along with customization of the banking proposition will support significant efficiency gains and instant, frictionless, and seamless customer service (Deloitte 2019a; PWC 2016, 2019; Bareisis 2019; Brackert et al. 2019; McKay 2017; Dab et al. 2017; Jain 2017; Booth et al. 2017; Silva 2019).

Incumbent banks pursue hybrid strategies such as developing in-house expertise or by-side offspring as their own challenger banks; using M&A to acquire proprietary technology developed by outsiders; forming consortia (to make minority investments in startups and acquire rights to their intellectual property), or cooperative strategic alliances with contractual commitments to technical vendors or partners (including Regtech and Insurtech).

A new business model shapes the industry operating on the technologically driven interoperability of infrastructures across markets fostering consolidation and convergence. The sophisticated propriety decision software will give advantage to creating value-added propositions, not any more commodity like, individualized financial services from various vendors (Deloitte 2019a; BNY Mellon 2014; PWC 2016; Ghose et al. 2017; Grasshoff et al. 2018b; Sella 2017).

Incumbent banks will undergo bionic transformation by blending digital and personal interactions to create a responsive and cost-effective distribution model with a converted value proposition combining human judgment with data power. They need to adopt a customer journey mindset with end-to-end processes supported with robotics and machine learning to reduce process intensity and improve customer satisfaction (Dupas et al. 2017; Morel et al. 2018; Baumgärtner et al. 2018).

Sustainable productivity improvement is imperative for the financial services industry. It is difficult to implement without transition to platform-based business model supported by digitalized employees embracing cultural change (PWC 2019).

Challenger Banks Not Always Quite New

New digital banks entered the market in mid-2010s benefiting from reduced capital requirements in some jurisdictions (e.g. OakNorth and Starling). Some of them were launched by incumbent banks (e.g. Di-Ba by ING, Pepper by Bank Leumi, New Hong Kong Virtual Bank by Standard Chartered, Hello Bank by BNP Paribas, FINN by JPMorgan Chase, Marcus by Goldman Sachs; Bo by RBS) to overcome the transformation barriers caused by their legacy networks. New branding targeting young market segments facilitated ventures with much lower cost structures. It can lead to much smoother transition to a new operating model without the burden of underused network (Ghose et al. 2019).

Digital banks with virtual banking license can leverage their balance sheet via fractional reserve banking for lending and earning spread on deposits. Therefore, they are subject to Basel regulatory framework to monitor risk/return on risk-weighted assets (Ghose et al. 2019).

Digital banks' growth was enabled by graduate expansion of their product offering including payments, credit cards, mortgages, auto loans, checking accounts, life insurance, and health insurance. They build their competitive advantage by addressing a clear consumer need: value, transparency, customization, and simplicity. There is a significant perceived value added of personalized insights and optimized service and the advantage for banks with prospecting, business origination and customer retention (Ghose et al. 2019; Desmangles et al. 2018; Bareisis 2019; Broeders and Khann 2015; Dupas et al. 2017).

Fintech Firms as Disruptors

The success of Fintech providers was attributed to regulators opening them access to traditional banking services on Fintech mobile money platforms. The initial areas including payments, lending, and robo-advisors were supplemented by international remittance, merchant payments, e-commerce, mobile lending, savings, insurance & FX products, mobile money, and G2P transfer offer solutions. (Ghose et al. 2019; Trieu et al. 2019; McKinsey 2018; Deloitte 2019c; Desmangles et al. 2018).

Fintech firms demonstrated tremendous growth in the last five years with impressive capital sourcing capabilities and innovating via crowdsourcing (the top 50 received more than $3.5 billion in equity). A broader access to customer base by Fintech providers can be obtained by collaboration with banks and Bigtech companies to overcome the scalability barrier, security, and data confidentiality (Ghose et al. 2017, 2019; Trieu et al. 2019).

Moreover, Fintech providers already operate on the digital platform for the worldwide community covering an impressive range of financial areas (banking and insurance) offering trusted and excellent mobile access-based customer experience (Ghose et al. 2019; Trieu et al. 2019; PWC 2016).

APIs gave Fintech firms an advantage of offering accessible and real-time faster and customized payments with value added solutions (Ghose et al. 2019; Backbase 2018; BNY Mellon 2014; Sella 2017). The most successful Fintech companies prioritize customer acquisition and retention while monetizing the opportunities offered by customer data collection (Trieu et al. 2019; Deloitte 2019b).

M&A and investment activity in 2018 continued to reflect the beginning of maturation of key Fintech areas of operation looking for increasing a critical mass via consolidation and preparation for the advent of more consistent regulatory oversight of the fragmented and with blurred boundaries financial services sector after digital systemic disruption. Internationalization of operations with its implications requires common standards and legal principles for maintaining trust in financial services after the period of regulatory divergence (He et al. 2017; Deloitte 2019a; BNY Mellon 2014).

All market players need to recognize that ensuring that customers control their 'data lives' will be both a commercial and regulatory imperative (Deloitte 2019c).

Bigtech Firms Pioneering Platform Companies

The keen interest in financial services of Bigtech, such as GAFA (Google, Apple, Facebook, and Amazon) or sometimes grouped as Facebook, Apple, Amazon, Netflix, and Google (FAANG), and BAT (Baidu, Alibaba, and Tencent) posed a significant challenge for all other market players. These businesses derive their value through what is called BeCoN, or behavioral, cognitive, and network capital (similar to Airbnb or Uber) based on their mutual marketplace platform driving transactions by using leading-edge algorithms to efficiently match supply and demand. Financial services have long been home to many platforms, such as stock and derivatives exchanges, clearing houses, and depositories, all created to benefit both the platform owners and their end clients, however not as open and customer facing as the new accessible and cybercommerce-related ones that recently emerged.

The way Bigtech firms conquered retail sector and their natural competitive advantage in customer acquisition based on the high user engagement model will let them focus on the most suitable financial services with cross-selling opportunities such as payments and insurance. Internet companies will

dominate the mass market and will be interested in products they can offer in collaboration with bank capital or 'rent out' the bank charter from smaller banks. Bigtech firms can host products from Fintech firms to collect the rent from them for the customer access (Ghose et al. 2019; Backbase 2018; McKinsey 2018; Desmangles et al. 2018; BNY Mellon 2014; PWC 2019; Broeders and Khann 2015).

The banking sector structure changes parallel other industries such as sharing platforms for online ticket booking or Airbnb for travel agencies and hotels (McKinsey 2018; PWC 2016).

Bigtech as a platform company will compete more on financial products rather than become broad-based banks. They are also more likely to be just a platform to channel banking processes with front-end offering from them or share-revenue from various providers and back-end processes rendered by traditional banks (Ghose et al. 2019; McKinsey 2018).

The proliferation of platforms for long- and short-term corporate contracts, such as Wonolo, Fiverr, or Talent Exchange, supported a gig economy transferring people's life into platform companies, including the demand for financial services (PWC 2019).

Conclusions

Digital revolution requires a profound transformation of the banking sector to reemerge on a sustainable collaborative virtual platform by the year 2025 and beyond. It is driven by regulatory, socio-cultural, demographic, and technological change forcing accelerated, costly, and risky adaptation. A reinvented financial services landscape will in turn affect the global economy and the global population with broader inclusion and a more competitive market structure. Intense scholarly and regulatory effort will be essential to mitigate risks and address ethical concern related to protection of customer assets, interest, and data.

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