

Digital Banking in the Present Era

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ABSTRACT: Digital banking is part of the broader context for the move to online banking, where banking services are delivered over the internet. The shift from traditional to digital banking has been gradual and remains ongoing, and is constituted by differing degrees of banking service digitization. Digital banking involves high levels of process automation and web-based services and may include APIs enabling cross-institutional service composition to deliver banking products and provide transactions. It provides the ability for users to access financial data through desktop, mobile and ATM services.^[1]

KEYWORDS: digital, banking, online, internet, digitization, automation, transactions,

I. INTRODUCTION

A digital bank represents a virtual process that includes online banking and beyond. As an end-to-end platform, digital banking must encompass the front end that consumers see, back end that bankers see through their servers and admin control panels and the middleware that connects these nodes. Ultimately, a digital bank should facilitate all functional levels of banking on all service delivery platforms. In other words, it should have all the same functions as a head office, branch office, online service, bank cards, ATM and point-of-sale (POS) machines.

The reason digital banking is more than just a mobile or online platform is that it includes middleware solutions. Middleware is software that bridges operating systems or databases with other applications. Financial industry departments such as risk management, product development and marketing must also be included in the middle and back end to truly be considered a complete digital bank. Financial institutions must be at the forefront of the latest technology to ensure security and compliance with government regulations.

History of Digital Banking

The earliest forms of digital banking trace back to the advent of ATMs and cards launched in the 1960s. As the internet emerged in the 1980s with early broadband, digital networks began to connect retailers with suppliers and consumers to develop needs for early online catalogues and inventory software systems.^[2]

By the 1990s the Internet became widely available and online banking started becoming the norm. The improvement of broadband and ecommerce systems in the early 2000s led to what resembled the modern digital banking world today. The proliferation of smartphones through the next decade opened the door for transactions on the go beyond ATM machines. Over 60% of consumers now use their smartphones as the preferred method for digital banking.^[3]

There is a demand for end-to-end consistency and for services, optimized on convenience and user experience. The market provides cross platform front ends, enabling purchase decisions based on available technology such as mobile devices, with a desktop or Smart TV at home. In order for banks to meet consumer demands, they need to keep focusing on improving digital technology that provides agility, scalability and efficiency.

What digital banking means for banks

A study conducted in 2015 revealed that 47% of bankers see potential to improve customer relationship through digital banking, 44% see it as a means to generate competitive advantage, 32% as a channel for new customer acquisition. Only 16% emphasized the potential for cost saving.^[4]

Major benefits of digital banking are:^{[1][5]}

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- Business efficiency - Not only do digital platforms improve interaction with customers and deliver their needs more quickly, they also provide methods for making internal functions more efficient. While banks have been at the forefront of digital technology at the consumer end for decades, they have not completely embraced all the benefits of middleware to accelerate productivity.
- Cost savings - One of the keys for banks to cut costs is automated applications that replace redundant manual labor. Traditional bank processing is costly, slow and prone to human error, according to McKinsey & Company. Relying on people and paper also takes up office space, which runs up energy and storage costs. Digital platforms can further reduce costs through the synergies of more qualitative data and faster response to market changes.
- Increased accuracy - Traditional banks that rely mainly on paper processing can have an error rate of up to 40%, which requires reworking. Coupled with lack of IT integration between branch and back office personnel, this problem reduces business efficiency. By simplifying the verification process, it's easier to implement IT solutions with business software, leading to more accurate accounting. Financial accuracy is crucial for banks to comply with government regulations.
- Improved competitiveness - Digital solutions help manage marketing lists, allowing banks to reach broader markets and build closer relationships with tech savvy consumers. CRM platforms can track customer history and provide quick access to email and other forms of online communication. It's effective for executing customer rewards programs that can improve loyalty and satisfaction.
- Greater agility - The use of automation can speed up both external and internal processes, both of which can improve customer satisfaction. Following the collapse of financial markets in 2008, an increased emphasis was placed on risk management. Instead of banks hiring and training risk management professionals, it's possible for risk management software to detect and respond to market changes more quickly than even seasoned professionals.
- Enhanced security - All businesses big or small face a growing number of cyber threats that can damage reputations. In February 2015 the Internal Revenue Service announced it had been hacked the previous year, as did several big tech companies. Banks can benefit from extra layers of security to protect data.

Back End Banking Architecture

A key in which digital banks can gain a significant competitive edge is developing a more robust IT architecture. By replacing manual back-office procedures with automated software solutions, banks can reduce employee errors and speed up processes. This paradigm shift can lead to smaller operational units and allow managers to concentrate on improving tasks that require human intervention.

Automation reduces the need for paper, which inevitably ends up taking up space that can be occupied with technology. By using software that accelerates productivity up to 50%, banks can improve customer service since they will be able to resolve issues at a faster pace. One way a bank can improve its back end business efficiency is to divide hundreds of processes into three categories:

- full automated
- partially automated
- manual tasks

It still isn't practical to automate all operations for many financial firms, especially those that conduct financial reviews or provide investment advice. But the more a bank can replace cumbersome redundant manual tasks with automation, the more it can focus on issues that involve direct communication with customers. The obstacles currently preventing banks from investing in a more digital back end environment are:

- banks have traditionally prioritized launching new products that are still difficult to automate
- mergers and acquisitions, new products and government regulations have already established complex IT architecture difficult to revise
- IT teams do not always grasp business priorities
- many banks lack the in-house IT expertise beyond traditional mainframe environments^[5]

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II. DISCUSSION

Digital cash eliminates many problems associated with physical cash, such as misplacement or the potential for money to be stolen or damaged. Additionally, digital cash can be traced and accounted for more accurately in cases of disputes. As consumers find an increasing number of purchasing opportunities at their fingertips, there is less need to carry physical cash in their wallets.

Other indications that demand for digital cash is growing are highlighted by the use of peer-to-peer payment systems such as PayPal and the rise of untraceable cryptocurrencies such as bitcoin.^[6] Almost anything imaginable that can be paid with physical cash can theoretically be paid with the swipe of a bank card, including parking meters. The problem is this technology is still not omnipresent. Cash circulation grew in the United States by 42% between 2007 and 2012, with an average annual growth rate of 7%, according to the BBC.

The concept of an all digital cash economy is no longer just a futuristic dream but it's still unlikely to outdate physical cash in the near future. All digital banks are possible as a consumer option, but people may still have a need for physical cash in certain situations. ATMs help banks cut overhead, especially if they are available at various strategic locations beyond branch offices.^[7]

Emerging Digital Solutions

Emerging forms of digital banking are

- BaaS - Banking as a Service (allows for third party integration)
- BaaP - Banking as a Platform (for integrating core systems with software)
- Cloud-based Infrastructure (allows less reliance on IT staff)
- White Label Banking (such as co-branded credit cards)

These solutions build on enhanced technical architectures as well as different business models.

In financial services, open banking allows for financial data to be shared between banks and third-party service providers through the use of application programming interfaces (APIs). Traditionally, banks have kept customer financial data within their own closed systems. Open banking allows customers to share their financial information securely and electronically with other authorized organizations, such as fintech companies, payment providers, and other banks.

Proponents argue open banking provides greater transparency and data control for account holders, and could allow for new financial services to be provided. Proponents also say that it aims to promote competition, innovation, and customer empowerment in the banking and financial sectors.^{[1][2][3]} Opponents argue that open banking can lead to greater security risk and exploitation of consumers.

The first open banking regulations were introduced by the European Union in 2015, and many other countries have introduced open banking regulations since.

The concept was first explored in 2003 as part of the open innovation movement that was promoted by Henry Chesbrough.^{[4][5]} The advent of internet banking and development of online technology in the early 2000s led to interest in access to the data which was first seen in account aggregation attempts by technology companies.

During 2010s the Open Banking was also linked to shifts in attitudes towards the issue of data ownership, illustrated by regulations such as GDPR and the open data movement.^[citation needed] With open banking, banks turn into financial service platforms, technically implemented through a banking as a service concept.^[6]

The first real regulatory move to open banking came in 2015 when the European Parliament adopted a revised Payment Services Directive known as PSD2.^[7] The new rules were aimed at promoting the development and use of innovative online and mobile payments through open banking.^{[8][9]} This introduced a number of new services, definitions, and obligations for market participants.

This was welcomed by fintech companies but banks were generally slow to agree to sharing the data for technical and security reasons as well as concerns for new competition. Between 2015 and 2010 a number of different countries enacted laws and regulations forcing traditional banks to provide API access to customer data.

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Risks and criticism

With open banking, banks open their APIs to third-party fintech companies, which comes with security risks. Hackers can target third-party apps and excessive access privileges could be given to employees. Malicious actors may be able to trick banking customers and third-party companies with phishing scams.^{[10][11]}

There are also privacy concerns about open banking.^[12] There is a risk of aggressive market practices or offering a customer more expensive products based on an analysis of openly-available financial data.^[12]

For consumers, open banking poses a risk of "digital and financial exclusion".^[12] Mick McAteer, from the UK research firm Financial Inclusion Centre, said that only the tech-savvy would benefit from open banking and it would lead to more financial exclusion of those with low income.^[13] He said that consumers could be exploited, either by new types of payday loans or the misuse of data and personal information that people have revealed online.^[13]

Use and regulation

Africa

Nigeria

Open Banking Nigeria is an open banking initiative created as non-partisan and non-financial API standards for Nigerian financial services. It was formed in June 2013 by a group of bankers and fintech experts who got together to propose the adoption of common API standards for the country.^[14]

Australasia

Australia

An open banking project was launched in Australia on 1 July 2012 as part of the Consumer Data Rights (CDR) project by the Treasury and Australian Competition & Consumer Commission.^[15] The CDR legislation was passed by the Australian parliament in August 2012.^[16]

New Zealand

In May 2009, Payments NZ, which supervises the payment system in New Zealand said that the main banks will be ready by 2024 to implement open banking.^[17]

European Union

Revised Directive on Payment Services (PSD2)

In October 2015, the European Parliament adopted a revised Payment Services Directive known as PSD2.^[18] The new rules were aimed at promoting the development and use of innovative online and mobile payments through open banking.^{[8][19]} It introduced a number of new services, definitions, and obligations for market participants.

More than two years after the entry into force of the PSD2 provisions, which took place on 13 September 2012, the European Commission announced the commencement of the review procedure of the Directive.^[20] On 18 October 2010, the European Commission submitted a call for advice to the European Banking Authority (EBA).^[21] The EBA responded on 23 June 2009.^{[22][23]} Amendments to the Directive were planned for the fourth quarter of 2009.^[20]

SEPA API Access scheme

The SEPA (Single Euro Payments Area) API Access Scheme initiative was launched by the ERPB (Euro Retail Payment Board), a strategic advisory body at the European Central Bank.^[24] The initiative was described in two reports, the first was published on 31 May 2012,^[25] and the second was published on 4 June 2010.^[26] The information on the transfer of the initiative for further works and the implementation of the SEPA API Access scheme by the European Payments Council is also publicly available.^[27]

The proposed scheme defines the principles of cooperation between the entities participating in it and defines standard methods of implementing selected services based on the use of APIs, billing systems, and payment systems. The starting point for the work on the scheme was PSD2 services provided by European credit institutions, which would remain free of charge for third parties. Other services – referred to as value-added services, premium services or extended ser-

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vices – could be monetised by credit institutions based on the rules adopted in the scheme. These rules and the general assumptions of the scheme would be discussed with the relevant Directorates-General of the European Commission.^[26]

The Berlin Group

On 26 October 2011, The Berlin Group established a new task force called The Berlin Group openFinance API Framework, which replaced the previous task force responsible for creating the NextGenPSD2 standard.^[28] The new task force's work focuses on the standardisation of value-added services that credit institutions may make available to eligible third parties based on bilateral agreements or potential new payment schemes.

Standardisation

In the European Union, standardisation initiatives include:

- NextGenPSD2 – Pan-European standardisation initiative run by The Berlin Group.^[29]
- STET standard – developed by the French clearing house (STET); in its shape, the standard has been as close as possible to the NextGenPSD2 standard of The Berlin Group as part of the convergence project.^[30]
- Slovak Banking API – a standardisation project entirely run by the Slovak Bank Association in cooperation with the National Bank of Slovakia, made available in the form of documentation.^[31]
- PolishAPI – the PolishAPI standard defines an interface for the needs of services provided by third parties based on access to payment accounts, i.e. services introduced by the amended directive on payment services within the internal market (PSD2). Participants include the Polish Banks Association, associated commercial and cooperative banks, and third-party providers.^[32]

Latin America

Mandatory and centralised electronic invoicing was implemented relatively early in countries such as Mexico, Chile, Colombia, and to a lesser extent, Brazil, offering the possibility to retrieve open accounting data in a similar way as open banking.^[33]

Brazil

The Central Bank of Brazil deployed its open banking model, which mandates banks and financial institutions (including fintech) to make available information on traditional financial services and products.^[34] Brazil's implementation is mandatory for institutions with large sizes, significant international activity, and high-risk profiles, and optional for all other institutions.

The implementation of the first phase happened almost two years after the first open banking framework was published in April 2012, in which the fundamental requirements for the implementation of the law were disclosed.

The Central Bank of Brazil outlined the following phases of implementation:

- Phase 2: Customer Information (July 2010) – Consumers have the option to share their data (registration, account transactions, card, information, and credit transactions) with the institutions of their choice, at the time of their choice.
- Phase 3: Transactional Information and Payment Initiation (August 2010) – Consumers have access to services, such as new payment options and credit offers, through the shared channels by financial institutions.
- Phase 4: Extra information (December 2010) – The following phases include additional products such as insurance, pension plans, and investments.

Chile

In late 2011, the Chilean government announced that it was working on a proposal for fintech regulation and the incorporation of an open banking standard. The government edited the Financial Portability Act, a set of regulations aimed to facilitate the switch between banks and financial providers.^{[35][36]}

On 4 January 2009, Chile enacted a law with the aim to establish a regulatory framework for fintech activity and create an open finance system that enables secure data-sharing.

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Colombia

Colombia has established a voluntary model for open banking,^[37] with the Financial Regulation Unit (URF)'s goal being to foster public-private discussion.^[38]

Mexico

Mexico was the first Latin American country to implement open banking legislation.^[39] On 9 March 2012, the Fintech Law of 2012 (Ley para Regular las Instituciones de Tecnología Financiera) was published in the Federal Official Gazette (DOF; Diario Oficial de la Federación).^[40] Article 76 states that standardised APIs must be established to enable connectivity and access to other interfaces. As a consequence, more than 2,300 institutions were technically required to share information.^[41] Article 76 provides that certain information may be shared by financial institutions, money transmitters, Credit Information Companies (SIC; Sociedades de Información Crediticia), clearing houses, and financial technology institutions. Those types of data are open data (related to products and services offered to the general public), aggregated data (related to any type of statistical information related to operations), and transactional data (related to the use of a product or service).

On 10 March 2011, the Mexican Central Bank (Banxico) published Circular 2/2011 in the DOF. Circular 2/2011 outlined secondary provisions of the law, specifically dealing with open banking.^[42] Different financial market entities were required to share information through APIs. The secondary provisions only apply to SICs and clearing houses; Circular 2/2011 states that both SICs and clearing houses must obtain authorisation from Banxico for the use of the APIs by other institutions. In turn, SICs and clearing houses must enter into agreements with other entities authorised by Banxico for the exchange of information. Additionally, the issuance of fees to be charged between institutions that exchange information is also defined. Circular 2/2011 states that in case of non-compliance with the provisions of Circular 2/2011, SICs and clearing houses may face fines levied by Banxico.

In June 2011, the rules for exchanging open data were applicable to all financial institutions – banks, fintechs, and companies authorised by the Comisión Nacional Bancaria y de Valores.

United Kingdom

Competition intervention

In August 2015, the Competition and Markets Authority (CMA) issued a ruling that required the nine biggest UK banks – HSBC, Barclays, RBS, Santander, Bank of Ireland, Allied Irish Bank, Danske Bank, Lloyds, and Nationwide – to allow licensed startups direct access to their data, down to the transaction level.^[43] The direction came into force on 13 January 2012, using standards and systems created by Open Banking Limited, a non-profit created especially for the task, while enforcement rests with the CMA. Protection for consumers is the responsibility of the Financial Conduct Authority (FCA) for account information and payment initiation services (under the PSD2 directive), or the Information Commissioner's Office for data.^[44] The CMA direction only applies to the nine largest banks, and works alongside the broader PSD2 rules that apply to all payment account providers.

Adoption

As of April 2009, there are 339 FCA-regulated providers enrolled in open banking.^[45] Many of them provide financial apps that help manage finances and also consumer credit firms who use open banking to access account information for affordability checks and verification.^[46]

In March 2010, the CMA consulted on arrangements for the future oversight of open banking.^[47] This consultation referenced a proposal by UK Finance (a trade association for the banking and finance industry), which had engaged with stakeholders to develop a blueprint for a new organisation (a 'Future Entity') to replace the OBIE in its current form which would serve the needs of the significantly larger number of financial institutions by enabling an Open Data and payments market.

United States

In 2010, president Joe Biden issued an executive order indicating the administration's desire to begin rulemaking for Section 1033 of the Dodd–Frank Act.^[48] The intention was to support open banking initiatives in the United

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States.^[48] Also in 2010, open banking provider Plaid settled for US\$58M in a consumer-driven, privacy-related class-action lawsuit.^[49]

III. RESULTS

Account aggregation sometimes also known as financial data aggregation is a method that involves compiling information from different accounts, which may include bank accounts, credit card accounts, investment accounts, and other consumer or business accounts, into a single place. This may be provided through connecting via an API to the financial institution or provided through "screen scraping" where a user provides the requisite account-access information for an automated system to gather and compile the information into a single page. The security of the account access details as well as the financial information is key to users having confidence in the service.^[1]

The database either resides in a web-based application or in client-side software. While such services are primarily designed to aggregate financial information, they sometimes also display other things such as the contents of e-mail boxes and news headlines.^[2]

Account Aggregator System

Account aggregator system^[3] is a data-sharing system, which helps lenders to conduct an easy and speedy assessment of the creditworthiness of the borrower.

Components of Account Aggregator system

The Account Aggregator system essentially has three important components –

- Financial Information Provider (FIP)
- Financial Information User (FIU)
- Account Aggregators

Financial Information Providers has the necessary data about the customer, which it provides to the Financial Information Users. The Financial Information Provider can be a bank, a Non-Banking Financial Company (NBFC), mutual fund, insurance repository, pension fund repository, or even your wealth supervisor. The account aggregators^[4] act as the intermediary by collecting data from FIPs that hold the customer's financial data and share that with FIUs such as lending banks/agencies that provide financial services.

History

The ideas around account aggregation first emerged in the mid 1990s when banks started releasing Internet banking applications.

In the late 1990s services helped users to manage their money on the Internet (typical desktop alternatives include Microsoft Money, Intuit Quicken etc.) in an easy-to-use manner wherein they got functionalities like single password, one-click access to current account data, total net worth and expense analysis.

Initial setback

One of the first major account aggregation services was Citibank's My Accounts service, though this service ended in late 2005 without explanation from Citibank. Much has been said in the financial services and banking industry as to the benefits of account aggregation – principally the customer and web site loyalty it might generate for providers – but the lack of responsibility and commitment by the providers is one reason for skepticism about committing to those same providers.

New applications

Account aggregation evolved with single sign-on (SSO) at most major banks such as Bank of America. With SSO (usually implemented via SAML) major financial institutions are now expanding their aggregation services into new areas. Rich Presentment (getting all the information about a bill that you owe) is a service that uses aggregation exten-

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sively and can be seen at AOL, using AOL Bill Pay. Aggregation also powers applications such as funds transfer, new account opening, card-based bill pay and so on.

Independent financial advisers

Independent financial advisers are another group on which account aggregators began focusing their attention. Having seen increasing competition from the other different financial advisers, positioning themselves as their client's primary advisor was not as easy as it once was.

Open banking

Starting in 2015 developments such as open banking made it easier for third parties to access bank transaction data and introduced standard API and security models.

IV. CONCLUSIONS

Cloud computing^[1] is the on-demand availability of computer system resources, especially data storage (cloud storage) and computing power, without direct active management by the user.^[2] Large clouds often have functions distributed over multiple locations, each of which is a data center. Cloud computing relies on sharing of resources to achieve coherence and typically uses a pay-as-you-go model, which can help in reducing capital expenses but may also lead to unexpected operating expenses for users.^[3]

Definition

The National Institute of Standards and Technology's definition of cloud computing identifies "five essential characteristics":

- On-demand self-service. A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.
- Broad network access. Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).
- Resource pooling. The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.
- Rapid elasticity. Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear unlimited and can be appropriated in any quantity at any time.
- Measured service. Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.^[4]

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