

The Effects of Technology in Retail Banking

by

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**BA Accounting
Universidad Autónoma de Baja California, 1996**

**Submitted to the MIT Sloan School of Management in partial fulfillment of
the requirements for the degree of**

**Master of Science in Management
at the
Massachusetts Institute of Technology**

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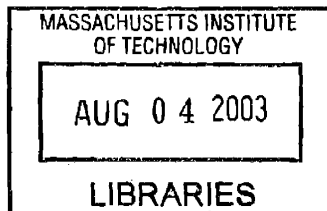
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ABSTRACT

This paper was written acknowledging that technology has become an indispensable part of banking and its purpose is to analyze the effects of technology in the retail bank-client service delivery and will only refer to the back-office aspect of banking (and related technologies) as it becomes necessary to support the arguments or descriptions, therefore depth regarding this area will be intentionally limited.

The paper is organized in 5 chapters. *Chapter 1, Retail Banking Industry, definition and analysis.* This chapter defines "retail banking" for the purpose of the paper, and presents a value chain and a five forces analysis to determine where technology could be more beneficial for the retail banks.

Chapter 2, Non-financial competitors, discusses examples of existing and potential technology enabled non-financial firms to offer financial services ranging from just an information source to full blown payment channel.

Chapter 3, Analysis of Relevant Technologies, brings some perspective on how technologies already adopted by end-users could be used (or are already been used) to deliver banking services. It also presents statistics about these technologies and a brief discussion on how consumers have changed their behaviors to embrace these new technologies. Some of these technologies are payment cards, mobile communication devices, internet, software agents and telematics

Chapter 4, Security and Privacy Concerns, due to the nature of the products and services in the banking industry, the issue of security and privacy are extremely important and they enhance or hinder consumer adoption of new technologies. That is why these concerns will be discussed in a separate chapter.

Chapter 5, Putting it All Together, building on the information gathered in the previous 4 chapters this fifth chapter presents a potential scenario of how these technologies could change the way we will do banking in the near future.

To my wife Clelia and my sons Ernesto and Luis Carlos
for their patience, love and understanding.

To my parents Lety and Ernesto
for their guidance and support.

To my brothers Luis Mario and Carlos Armando
for always being there for me.

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Chapter 1

Retail Banking, Industry definition and analysis

Banks have long participated of business transactions. Some researchers trace the first banks to Italy nearly seven centuries ago and attribute its name to the Italian word for stool, “banca” in reference of the stool that clerks use to seat in. Britannica.com defines a bank as:

“An institution that deals in money and its substitutes and provides other financial services. Banks accept deposits and make loans and derive a profit from the difference in the interest rates paid and charged, respectively.”

The business of the banks has evolved as a consequence of the evolving financial needs of customers; nevertheless, the core business (receiving deposits and allowing access to money) has not changed.

Types of Banks

How today’s banks are organized will most likely depend on the specific firm one chooses to analyze, nevertheless there are three common segments in most banks, Corporate and investment banking, private banking and consumer/retail banking.

Corporate and investment banking

This segment of the bank provides tailored and unique solutions to top corporations, financial institutions and governments, offering strategic and financial advisory services that include: mergers, acquisitions and divestitures; loans and financial restructurings; cash management, treasury and foreign exchange transactions; underwriting and distributing equity, debt and derivative securities; and develop e-commerce solutions.

Private Banking

The second segment of provides personalized wealth management services and related services to a broad spectrum of clients that includes beginning investors, wealthy individuals and large institutions, both public and private. The main object is to create and deliver a broad offering of alternative investments, including hedge funds, credit structures, private equity, real estate, mutual funds, managed accounts, retirement services as well as private and institutional portfolios catered to the needs of every class of investor.

Consumer banking

This third and last segment of banking is what most people refer to as a “bank”; it provides banking services (savings and checking accounts are the most common), credit cards, loans and insurance to small firms and individuals. 70% out of the 2 million wage and salary workers employed by the banking industry; were employed in consumer banking⁹⁸. Consumer banking is commonly divided in two sub-segments, commercial banking -small firms- and retail banking -individuals-. This research will focus on the effects of technology in the retail part of consumer banking.

| | 2001 | | 2000 | | 1999 | |
|------------------|------------------|----------------|------------------|----------------|------------------|----------------|
| Consumer | 7,366.00 | 49.96% | 6,004.00 | 44.10% | 4,975.00 | 43.90% |
| Corporate | 5,844.00 | 39.63% | 6,166.00 | 45.29% | 5,138.00 | 45.34% |
| Private | 1,535.00 | 10.41% | 1,445.00 | 10.61% | 1,219.00 | 10.76% |
| Total | 14,745.00 | 100.00% | 13,615.00 | 100.00% | 11,332.00 | 100.00% |

Citigroup Annual Report 2001

Figure 1

Because of the consolidation trend in the banking industry in recent years, the boundaries of what has traditionally been known as retail banking are blurred, and have come to include other types of financial services. That is why; for the purpose of this research “retail banking” will refer to the delivery of type of financial services to individuals, including firms that provide some or all of the next financial services, among others:

- Savings (saving accounts, CDs and other investment products)
- Loans (home mortgages, car loans, personal loans and credit cards)
- Payment (credit cards, debit cards, checking accounts and electronic transfers)
- Cash (ATMs and branch withdrawals)

It is also worth mentioning that this definition of retail banking is intentionally broad to allow for the inclusion of non-financial firms that have entered the banking industry, to which the third chapter of this thesis will be devoted.

Geographical Reach

Another important aspect of banking is the fact that it is becoming more and more international due to the consolidation mentioned above and large banks are now providing services to several international markets.

Nevertheless, this research will mainly focus on the United States market and will only draw upon lessons from banks in other countries and its experiences as they become relevant to the purpose of this research and applicable in US due to the regulatory restrictions. No further distinction is made between local, regional or national banks.

Industry Analysis

The previous paragraphs present a definition of the industry and the concepts that will be used throughout paper. The next part of the chapter will present an industry analysis (five forces and value chain analysis) which will in turn serve as a tool to identify the needs and opportunities for technology investment.

Porter's Five Forces Analysis

The first part of the retail banking industry analysis is a Porter's five forces analysis (strength of barriers to entry of new competitors, threat of substitutes,

bargaining power of buyers and suppliers, rivalry among competitors and government regulations). This analysis is intended to provide further knowledge of the industry and help identify opportunities for technology to improve or facilitate the delivery of banking services.

Barriers to entry of new competitors

Despite capital and regulatory requirements, an average of 215 new banks a year have been open since 1977 according to information from the Federal Deposit Insurance Corporation (FDIC) as shown in Exhibit 1.

Nevertheless, due to the number of mergers and failures (average of 468 a year) the total number of banks in the system has decreased at an average rate of 253 banks per year since 1977 as shown in Exhibit 1. Figure 2 presents the increase in number of branches and decrease of main offices in the past 10 years.

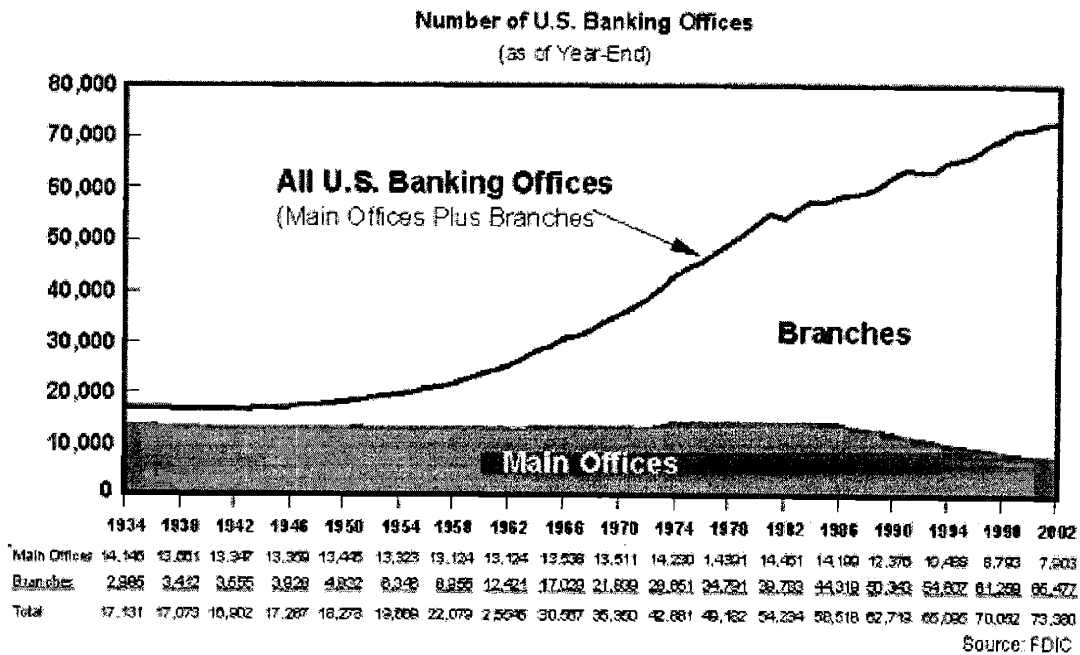


Figure 2

Another important issue that presents a barrier to entry for new competitors is trust. Because of the nature of the business requires institutions to deal with other people's money and financial information, customers prefer well-known trustworthy institutions in order to open an account.

The banking system has undergone a consolidation that aims to serve “all financial needs under one roof and on various geographical locations. This consolidation leverages on the importance of trust and brand recognition in the industry further raising the capital requirements and therefore increasing the barriers to entry for new competitors.

Based on the previous data one can conclude that the barriers to entry in the banking industry are medium to low, because, it is difficult to enter the industry as a bank with the full range of products and services but it is relatively easy to open a local or regional bank with limited product and service offerings.

Threat of substitutes (non-financial competitors)

It is well known that technology can allow new entrants in an industry and banking is no exception, one of many examples that are worth looking at is in payment systems.

Mobil, a firm better known to customers for its gasoline and petroleum derivatives but in 1996 partnered with Wayne/Dresser Industries, Texas Instruments and VeriFone to develop and introduce an innovative payment system called Speedpass.

The main idea behind Speedpass was to increase convenience in self service gasoline purchases by increasing the speed of the transaction but now has more than 5.5 million users and payment has extended beyond the 7,700 Exxon-Mobil gasoline pumps to include the convenience stores and car washes located in the gas stations.

Recent trials include more than 440 McDonald's in Chicago and Northwest Indiana and its testing the service in selected Stop & Shop locations where a new feature was added enabling customers to link their Stop & Shop card and therefore enabling them to automatically get discounts and rewards when paying with Speedpass.

Mobil has also teamed with Timex to not only offer the keychain fob but also a variety of watches with Speedpass capabilities. This and several other examples of non-

financial firms entering the banking service arena will be discussed later in the document as *Chapter 2, Non-financial competitors*.

Based on the information presented above, one can conclude that the threat of substitutes is high for particular services such as payment systems but low for banking services as a whole.

Bargaining power of buyers

There are 3 factors that should be considered when assessing the bargaining power of bank customers 1) The same base of products is offered by most players in the industry; 2) Customers are now recognize that their deposits or loans are not only important for them but also for the banks; 3) Internet technologies have reduced the cost of comparing the price of holding an account in several banks before committing to one.

When analyzing the previous paragraph and acknowledging the advantage the Internet gives to customers by enabling them to “shop” for the cheapest provider of financial services with “a click of the mouse”, one would deduce that buyer’s bargaining is high, nevertheless, there are important security and privacy considerations that increase bargaining power of banks.

Because banking is about managing people’s wealth and information, customers look for a trustworthy institution that will provide them with a secure platform to manage their accounts and will not sell, lease or otherwise share their personal information with undesired third parties. This is the reason why aspects such as brand and track record become relevant for customers reducing their willingness to open an account with “*the cheapest*” and rather choose “*the cheapest among the safest*”.

Chapter 4, Security and Privacy concerns will analyze in greater detail the strong impact that customers’ concerns about security and privacy have on the adoption of potential new banking channels enabled by the emergence of new technologies or the usage of existing technologies in new ways.

A third element that is important when choosing a bank to open an account with or have a loan with is the range of products and services that the institution can offer, for some clients it is important to have the possibility to access their money in all states or even abroad that is why they choose to work with a larger bank, nevertheless, for others working with a small local or regional bank is better because their financial needs are not as complicated and would rather have a *“personalized service”*.

After analyzing the previous paragraphs one can conclude that bargaining power of banking customers is medium, because, although products are “commoditized” across banks, not all banks respond equally to customers’ needs and various degrees of security and privacy concerns.

Bargaining power of suppliers

Considering that the raw material for a bank is money there are four main sources of money for banks, 1) customers’ deposits, 2) sale of mortgages and other loans, 3) issuance of mortgage-backed securities (MBS) and 4) loans from other financial institutions.

By using these four sources of money, the banks insure the necessary resources to serve customers’ borrowing needs while providing the availability of funds for depositor’s withdrawals.

The first source of money of a bank is the customer deposits, and the analysis and relationship with clients at this end of the value chain is the same of that at the opposite end, that is, clients that ask for a loan usually also have a savings account or a checking account and choose a bank to have this deposits on mainly the same basis discussed above, and therefore have the same bargaining power in both ends.

The next two sources of money are closely related, the sale of mortgages and mortgage-backed securities. Mortgages that comply with the guidelines for credit worthiness and repayment likelihoods and are smaller than the set threshold (approximately \$300,000), are sold on the secondary market mainly to two organizations, Fannie Mae and Freddie Mac. Once they have purchased the mortgages, Fannie Mae and Freddie Mac issue Mortgage-Backed Securities (MBS) in exchange for

pools of mortgages from the banks, providing them with a more liquid asset to hold or sell. Large financial corporation issue their own MBS. These MBS are highly liquid investments and are traded on Wall Street through securities dealers.

Finally banks sometime also need to look for financing from other banks or support funds such as the Import-Export bank and others that provide cheap resources to finance operations from particular industries or with particular conditions. These sources of financing have a high bargaining power.

Because these sources of funds are strongly dependant on the market, the bargaining power of suppliers is medium to high, signaling that banks depend on take the market to price their mortgages and securities but this pricing is influenced by the type and size of the bank as well as the credit worthiness of the mortgage portfolio.

Rivalry among existing competitors

With approximately 8,000 banks and 74,000 branches, it is not hard to say that United States has a very fragmented industry compared to banking systems in other developed countries. Nevertheless, historic data from 20 years ago reveals that the banking system has gone through significant consolidation (there were more than 14,000 banks in 1974). This consolidation has had three main purposes, 1) increase the banks' geographic coverage, 2) increase the number of products and services offered to their clients and 3) leverage on the economies of scale that the size provides.

By participating in several international markets, large banks not only spread their fixed cost across a wider number of markets but can also "test" a service in a distant but relevant market and then return to US leveraging the knowledge acquired and therefore increasing the probabilities of success, e.g. Citibank can deploy a new mobile payment service in Philippines, Finland or Japan and delay bringing it to the US market until the product or service has endured the strongest tests.

It is also important to note that when compared to the assets of the whole industry, in December 31, 2001 the assets of the largest bank in the US banks accounted for 16%, the three largest banks accounted for 36% of the industry, the 10

largest banks accounted for 59% and the largest 80 banks accounted for 70% of the assets, with regard to customers, the 5 largest banks control 60% of the credit card market and the 30 largest banks account for 40% of the deposits.

These numbers presented above show that rivalry in this industry is high, and it will remain so as large players keep on merging with regional and local banks in their pursuit to become national banks with presence in all states.

Another factor that increases rivalry is the stronger presence of large international players such as HSBC, BBVA, Santander Central Hispano, and others that have a global scale which allows them to have access to a wider range of sources of low cost funding.

Government regulations

In the retail banking industry, government regulations are particularly important. A very good example of this is the fact that the American banking system has been undergoing a large consolidation due to changes in regulations that now allow for a bank to participate in a wider range of financial services. Now there is a strong tendency in some players to adopt a universal banking system much as that of several European and Latin American countries.

Retail Banking Value Chain

The value chain presented in Figure 3 is not intended to show a specific bank value chain but rather to identify the main activities of a “typical retail banking operation”.

The value chain focuses on the intermediation of money between depositors and borrowers as the core business and includes banking services infrastructure, human resource management, information management, accounting and inter-bank transactions as secondary or support activities.

Banking Value Chain

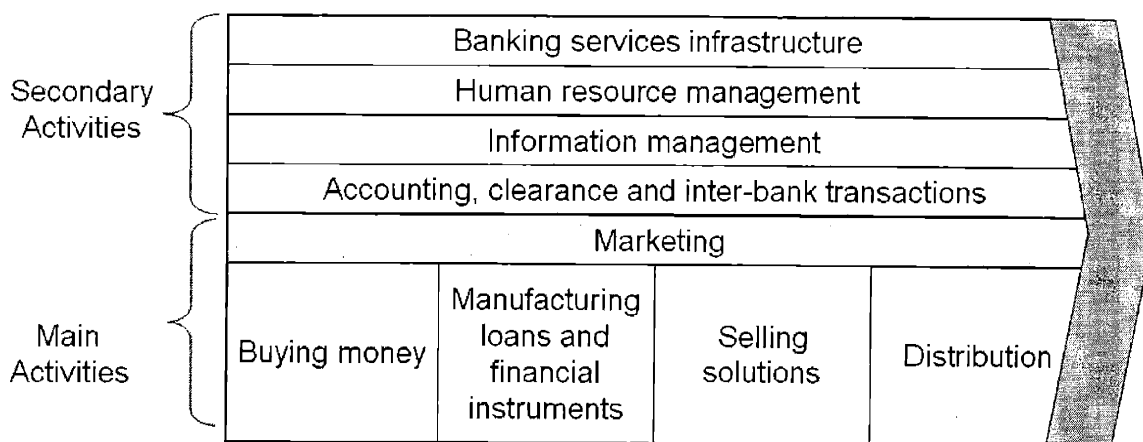


Figure 3

Secondary Activities

Although the banking services infrastructure, human resource management, information management and accounting, clearance and inter-bank operations are extremely important for the appropriate delivery of banking products and services, and according to the 2002-2003 edition of the department of labor's occupational outlook handbook, office and administrative support occupations account for about 2 out of 3 jobs in the banking industry; these activities are not the main business of a bank but merely provide the necessary platform for this main business to happen. That is why the value chain represents them as secondary activities.

Banking services infrastructure

One of the most common connotations of the word infrastructure is to refer to physical buildings and other type of real estate property, nevertheless, in this setting the term banking services infrastructure is used in a broader sense and is intended to include all 6 types of channels used to process or deliver services: automated teller machines (ATMs), points of sale terminals (POS), mobile and land based phones, internet banking, as well as the bank branches as shown in Figure 4.

Banking Channels

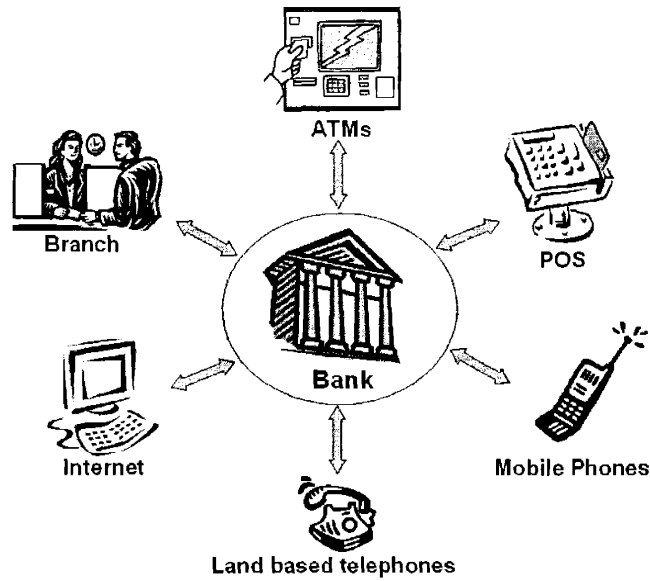
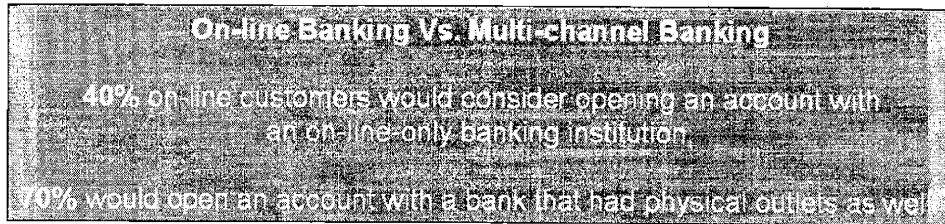


Figure 4

By having the optimal combination of banking channels available to its customers, banks increase their client's convenience of working with them and increase switching cost by getting them used to the convenience that these channels provide and therefore encouraging customer's not to change their financial services provider.

As with many other industries, banking was also expected to miraculously change with the use of the Internet and the disappearance of bank branches was "imminent" and repeatedly announced. Nevertheless, banking was no exception; these "miracles" did not fully materialized.

In fact, a 2000 McKinsey Study denotes the customers' preference for banks that offer their services both online and on physical outlets and a 2001 study by Tower Group shows that 85% of Americans who have signed up for internet banking still do regular visits to their bank branches, which reflects the fact that customers are willing to take advantage of new channels but they do not completely modify their old behavior.



Matthias M. Bekier, Dorlisa K. Flur, and Seelan J. Singham (2000), A future for bricks and mortar in banking, The McKinsey Quarterly, McKinsey & Company, Washington, Atlanta

Figure 5

More recently industry experts are now speculating that bank branches would reduce their size and structure to become small physical locations that will serve as a point of contact for certain services, becoming just one of many banking channels without disappearing, at least in the near future.

With the increased use of payment cards (US consumers carry more than 376 million Visa cards alone), ATMs and POS networks have increased their importance in the delivery of banking services because it is a convenient mean to enable access to people's money without having to go to a branch and write a check. More over it is not restricted to office hours or predetermined physical locations, for example, Visa cardholders can pay in approximately 28 million locations worldwide and access their accounts in over 820,000 ATMs in 120 countries.

Figure 6 shows the growth in total number of ATMs in US from 1991 to 2001, it is nevertheless important to mention that the number of transactions per ATM has decreased from 6,403 in 1991 to 3,494 in 2001.

Because of the wide variety of possible improvements that could be made in the banking infrastructure, this document will further discuss opportunities for improvements that can enhance customers' banking experience and reduce dependence on people-to-people contact.

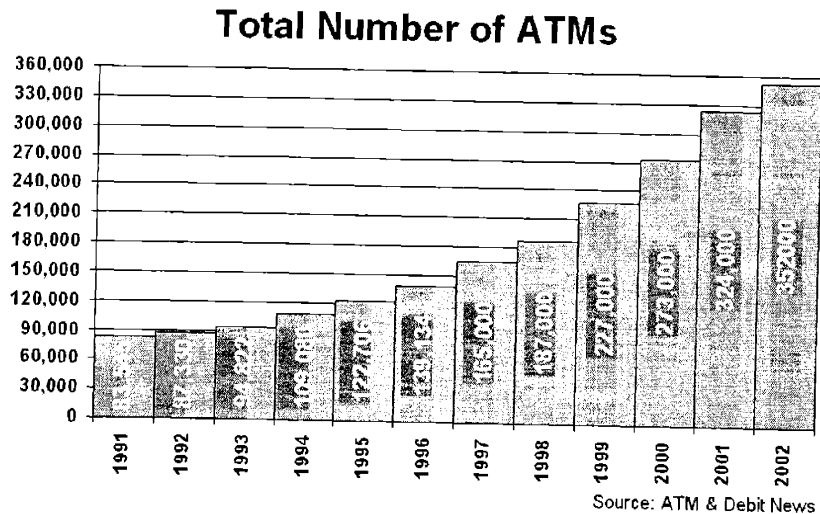


Figure 6

Human Resource Management

As one might expect, because banking requires employees to manage customers' money and confidential information, customers expect to deal with honest, trustworthy, knowledgeable and friendly employees, therefore it is a very important for banks to have an excellent human resource department that will allow them to have the most qualified people working with them.

Because having a trustworthy and knowledgeable work force has become common place in the banking industry, technology investment in this area does not provide a sustainable competitive advantage. Besides, employment of bank branch managers, in particular, will grow very little or not at all as banks open fewer branches and promote electronic and Internet banking to cut costs.

This does not mean that banks should stop investing in human resource management, in fact banks employ approximately 1 out of 8 financial managers and technology can be put to a good use in helping to maintain the employees' specialized financial knowledge up to date but the author does not consider human resources management to be a priority for technology investments and therefore this research would not focus on this aspect of technology applications.

Information management

The bank is one of the few privately held institutions that keep a large amount of private information about their customers in their databases, most likely second only to health care providers. That is the reason why security and privacy are two very important aspects of banking operations and will be further discussed in *Chapter 4, Security and Privacy Concerns*.

As in many other information intensive industries, a bank is strongly dependant on its capability of managing the information that flows through its systems and reacting to it. That is why in recent years several banks have done large investments in Customer Relationship Management (CRM) systems to better understand key customer groups, gain more knowledge about their needs and values to engage them in one-to-one marketing, monitor their response to marketing efforts, improve delivery channels and establish long-term relationships with them.

On the other end of the banking business is the information exchange with third parties; this information exchange allows for payment transactions to take place. That is why, although this exchange is invisible to customers, its end result is extremely important and any inconvenient with it would prevent customers from using that payment mechanism.

It is worth keeping in mind that once money has been deposited in the bank, customers are, for the most part, left only with information such as the account balances and transactions summaries, therefore information substitutes physical currency and customers want to have control over it.

Accounting, clearance and Inter-bank operations

Most large banks have already invested in accounting and back-office operations which have helped them reduce the amount of time their employees devote to this type of activities. Technology investments have also helped them increase the speed at which inter-bank operations are done.

A great example of such IT investments in back-office processes that have boosted labor productivity is check-imaging. This technology has reduced labor and storage costs by approximately 40% and check-retrieval time by as much as 75%⁶².

Call-centers are among the support activities that have been improved by technology investment. The automated voice response units helped reduce the number of representatives by half through handling more than half of the telephone inquiries.

Although the operations that take place in this stage of the banking business require time and resources, these operations are transparent for the customer. These operations rely heavily on the banks capability to manage back-office operations and the compatibility among systems across different banks.

In the past 10 years, banks have made large investments in technology for back-office operations and new investments are mostly expected as upgrades from current systems rather than expansions of the existing platforms.

Marketing

In banking, marketing is important because it provides a tool for banks to increase customers' trust by positioning their brands. When deciding where to open a branch, a bank is also deciding, to a certain extent, the type of customers, the quantity of them, the type of products and services these customers will require as well as the additional channels they would expect.

Marketing is an ongoing activity that supports the sale of financial solutions as well as the distribution of them.

Main Activities

Buying money

To buy money -receiving deposits- banks identify the financial needs of potential customers to attract new customers and keep existing ones by tailoring solutions.

Identifying financial needs is not limited to the type of service a certain customer groups needs but also to the price sensitivity to any particular type of financial product or service.

Most people need a bank for two main reasons, 1) to have their money in a safe place and have the possibility to access it when they need it and 2) to borrow money that will allow them to make an acquisition that otherwise would not be possible, therefore identifying financial needs can be defined as finding the reasons why people want to access and/or borrow money, as well as the price sensitivity of doing so.

By providing self-assessing tools through the internet, most banks have successfully enhanced their capabilities in identifying customers' financial needs. This activity has also encouraged the emergence of new players that allow customers to compare bank offerings of several types of services such as mortgages and credit cards.

This first step of the chain is oftentimes done in parallel with other activities such as managing the customers' financial information, and enabling payment and will therefore be discussed during the document as a complement to other activities.

Manufacturing loans and financial instruments

In order to maximize the profits from the bank monetary resources there are two activities that are of strategic importance, the treasury (for investment of the excess cash, sale of mortgages and MBS, among others) and the credit-risk management (analyzing credit worthiness and monitoring loan repayment, among others).

By excelling in creating and managing the portfolio of financial instruments, the banks not only increase their profit margin but also diversify their risk and leverage their size and the diversity of markets served.

The banking industry has already done investments in communication technology that have increase the effectiveness of treasury and risk management activities, nevertheless there are no foreseeable significant improvements that could be

achieved with additional investment in technology, and therefore these support activities will not be discussed in further detail in the document.

To enable the intermediation between deposits and loans, banks rely heavily in three secondary activities banking services infrastructure, information management and accounting, clearance and inter-bank transactions. It is also worth mentioning that this manufacturing of financial instruments is relatively invisible to customers.

Selling solutions

Once customers' financial needs have been identified, and the appropriate financial instruments have been manufactured, the relevant question is, how should the bank proceed about providing value to its customers' by offering banking solutions such as CDs, checking accounts, savings accounts and loans

It is at this stage that customization enabled by technology has added value to the banking services, a very good example of this is clear in the credit card market, where there are several types of rewards programs, annual fees, annual percentage rates, balance transfer rates as well as a number of combinations of all of the above and other characteristics.

While customization allows banks to offer a larger variety of products, it is also true that it has also increase the level of complexity of the databases to manage them.

Distribution

As previously discussed, one of the main reasons why a customer needs a bank account is because he/she wants to have a more convenient way to access to his/her money, that is, it is more convenient to have a debit card and pay for dinner at a restaurant, a movie in the movie theater and clothes in the store than having to carry enough cash in one's pocket to pay for all of this.

It is at this stage that the bank's infrastructure becomes particularly relevant, because providing customers' with the appropriate channels to make a deposit or

access their money increases the convenience of dealing with the bank. Some of these channels include POS, ATM and bank branch networks.

Some banks have encouraged their customers' to increase use of cheaper, more convenient channels and therefore increase profitability on both ends. These forms of encouragement vary widely and have come to include reward programs, sweepstakes, reduced or waved fees among others.

Regardless of the convenience the diverse payment mechanisms may offer, customers want to feel safe when using and carrying the selected payment device. One way to analyze this concern is to think about what would happen if one loses his/her wallet, what would he/she be more concern about. Cash has what could be seen as limited liability and if he/she loses a \$100.00 bill, they already know how much have they lost (\$100.00) but, what happens with payment cards? How much would he/she be liable for?

Banks have gone beyond only offering access to customer's money and also guaranty them a limited liability in case of theft or lose but ask for customer's cooperation in reporting the fact to the institution. In most retail banks, payment is a core activity that generates approximately 35% of total bank revenues and it is estimated that if one third of checks are substituted by electronic transactions productivity would increase by 1.8% per year due to the consequent reduction in personnel⁶².

The Research's Focus

Based on the industry analysis presented in this chapter, the emphasis on this research will be given to customer-bank relationship in product and service delivery, more specifically to payment systems. Back office operations will only be touched upon as they become relevant to delivery of financial products and services in the context of the research.

Chapter 2 will further elaborate on the entrance of non-financial institutions in the financial service delivery, chapter 3 will review several relevant technologies that are used or can potentially have an use in financial services, chapter 4 will discuss security

and privacy issues and chapter 5 will present an outlook of the future of retail banking based on the analysis done in the first 4 chapters.

Chapter 2

Non-financial competitors

The threat of non-financial competitors in banking services is high; electronic and mobile commerce have created opportunities for new competitors which now represent a threat to the bank's payment business.

Among the benefits of participating in the payment business is the fact that keeping track of payment transactions allows the owner(s) of the system to gather valuable customer information such as consumption patterns, creditworthiness and financial needs which can be used as a resource for cross-sale of products and services that do not need to be financial.

This chapter will present firms that already are competing in financial services market as well as potential new entrants.

RFID enabled

The next three examples, Mobile Speedpass, E-Z Pass, and Octopus are contact-less payment mechanisms enabled by Radio frequency identification (RFID). RFID is a wireless system consisting of radio frequency transponders and signal transmitters/receivers, allowing for contact-less exchange of, for the most part, simple data. Although this technology was primarily developed for electronic product codes and substitute bar codes, it has successfully been used in contact-less payment devices.

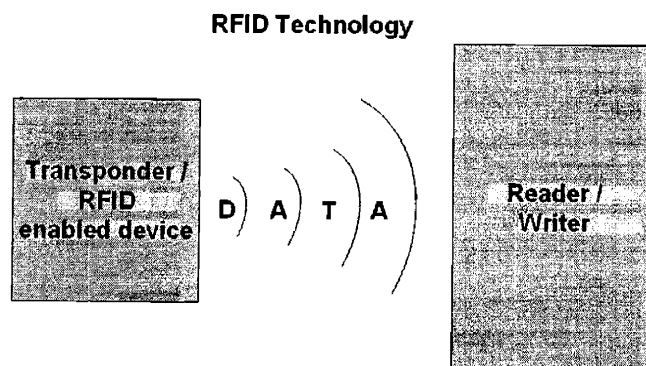


Figure 7

RFID transponder and reader shown in Figure 7 can communicate to one another through large distances -20 feet- such as that from the car to a toll payment booth, RFID payment devices for POS should be constrained to a 5 inches distance to provide increase security for the customer.

Mobil Speedpass

Mobil's Speedpass has approximately six million users and can be used not only in 7,700 Exxon-Mobil gasoline pumps but also in convenience stores and automated carwashes located in the gas stations as well as 440 McDonald's in the Chicago area.

Selected locations of Stop & Shop supermarkets in Framingham and Natick areas are now testing Speedpass and during this test, the digital code transmitted by the radio transponder not only links the fob-holder to the selected credit card but also to the Stop & Shop customer card, therefore enabling the system to recognize him/her as a frequent buyer and give the appropriate discounts and rewards while prompting paying with their credit card, just by waving the fob in front of the radio receiver located in the cash register.

Mobil did not stop in the merchant side of the payment chain but has also teamed up with Timex to develop alternatives to the keychain fob. Now, for \$45.00 Speedpass users can have a Speedpass enabled watch¹⁵⁵. This innovation was particularly interesting considering the fact that the vast majority of people carry a wrist watch or a key chain therefore positioning Mobil to become the payment mechanism of choice.

E-ZPass, Transpass, FastLane and FasTrak

Electronic toll collection systems (ETC) not only help reduce congestion and auto emissions by reducing toll plaza delays but also put a payment mechanism at the drivers' reach.

With an estimated 35% of US motorists holding an ETC tag in their cars and an average of time 36 hours a year a person spends in transportation delays, it is no surprise that system owners have tested other drive-thru services with ETC tags.

TransCore and a McDonald's franchisee (Baibrook) enabled 45 McDonald's restaurants in the Dallas area to use ETC tags in their drive-thru. According to their published results, the usage of ETC tags increased the average drive thru sale by 40%.

A conservative estimate of \$5 dollars average sale, time spent per car of 5 minutes, and 8 working hours a day, sales for a drive thru would amount to \$ 480.00 daily or about \$175,000 a year per location.

Electronic toll collection systems such as E-ZPass and Fast Lane are not only used in the US but several other countries around the world.

Octopus and other metro systems

In 1997 six mayor Hong Kong public transport operators introduced a new ticketing based on contactless smart card technology through a joint venture named Octopus Card Limited. The introduction of this common ticketing was expected to improve the efficiency of fare collection by eliminating the need for cash in the public transport system.

The Octopus contactless smart cards have an operating range of 3 to 10 cm, which allows users to pass through the turnstiles without having to remove the card from their wallets. These cards are also designed to accommodate versatile information, and therefore a single card can manage several different applications while ensuring individual security.

To date, more than 8 million people in Hong Kong hold the contactless smart card developed by Sony and its use is well beyond public transport and it is now accepted in fast food restaurants, convenience stores, parking garages, vending machines and public phones.

But not only in Hong Kong can one find this payment system, more than 60 percent of peak-time riders on the Washington, DC's subway network have switched

from magnetic-stripe tickets to “smart cards” embedded with memory chips. Radio transponders and similar systems are being planned for other US cities.

The options for users to load their smart cards vary from kiosks located in the subway stations to the Internet which increases customer convenience. These electronic-payment devices are capable of going way beyond public transit projects and are expected to be used in other types of payment and reward programs.

The effects on banks

The RFID-enabled contact-less payment methods can potentially alter consumer behavior, streamline the use of payment devices at retailers, and bring the use of non-cash payment systems into sectors where they are not currently prevalent, therefore taking a revenue stream from banks.

Internet based competitors

The second classification corresponds to competitors enabled by the internet and is mostly formed by players that did not exist before the emergence of this new medium. The most salient example in this category is PayPal.

PayPal

PayPal enables people to exchange money instantly online without having to open merchant accounts to accept credit cards and offers its services to users in 38 countries and has more than 20 million registered users, and its account base is growing by an estimated 28,000 accounts per day⁷².

Its rapid adoption by millions of users operating on the Internet auction site eBay is largely credited to its financial surveillance software that closely monitors PayPal's customers and almost instantly alerts both the company and law enforcement officials to any suspicious account activity.

PayPal claims it has found a way to bring the online fraud rate down to less than 0.5 percent, thus eliminating about 60 percent of the risk of taking credit cards online.

As one might expect several competitors have emerged, in March 2000 eBay acquired Billpoint and began running it as a joint venture with Wells Fargo. This venture did not succeed because of the large network effect that this type of services have; early adopters were already using PayPal and did not want to start using a different service that will do the same.

In the fall of 2000, Citibank, introduced c2it, marketed via multimillion-dollar deals with Microsoft and America Online but only managed to sign up 100,000 customers in its first year, despite offering a \$10 sign-up bonus.

Although PayPal is the service with the largest number of users, it is not clear yet what future developments the online payment field will undergo, or if this competition to become the payment mechanism of choice might go off-line with PayPal introducing debit cards, so that customers can use their PayPal accounts for offline transactions as well.

Not only PayPal has entered the electronic money market but also various sites have introduced this type of services including but not limiting to Western Union in using its own network and Terra Lycos in cooperation with Cashpin.

Banks' response

The way large banks such as Citibank have chosen to compete against this innovative internet based competitors is not only to introduced and actively marketed their services but also to leverage their existing branch network as a complement to those services.

A good example of this is Citibank's e-mail based money sending service, C2it. For the last several months, Citibank has marketed this service to Latin American immigrants so that they can send money to their relatives in their native countries. Users

in those countries can choose to deposit the money in an account or collect it in cash at a bank branch.

Citibank does a particularly good cross-selling job with C2it service to Latin America and it increases their customers' convenience by leveraging its subsidiaries' bank branch network. Citibank allows C2it customers to send money to Banamex clients at a relatively low cost and ease of access.

Competitors from retail

Trying to leverage their customers' "state of mind", it is not rare to see retailers participate in the delivery of several financial services; the next 4 examples illustrate the variety of financial products and services that retailers provide either by themselves or in partnership with others.

Wal-Mart

Wal-Mart offers a personal finance tools such as Wal-Mart credit cards through Monogram Credit Card Bank of Georgia, and Chase Manhattan Bank USA, NA, Pre-paid reusable shopping cards, money transfers through the MoneyGram network, ATMs, Express Bill Payment, money orders and check printing.

Target

Target offers a Target VISA and balance protection through Retailers National Bank, on-line account management (application, statements and payments) and pre-paid gift cards.

Staples

Staples offers a large variety of products and services for small business all of them through diverse partnerships. Among the services offered: accounts receivables financing and management, business leasing, Staples credit cards, credit card processing, business credit reports, debt collection, payroll and computer checks.

Among Staples' partners are two large financial institutions, American Express for business leasing and Citibank for the issuance of credit cards.

Sears

Sears offers several types of individual credit cards that include private network, MasterCard co-branded cards and well as a Home Improvement account. Sears also has a Sears Commercial One account targeted to business customers and an account protecting service.

Opportunities for banks

Although the entrance of retail chains in providing financial services might seem daunting at first, it actually represents an opportunity for banks to leverage. Competing in banking is not only about having excess cash but also having the necessary platform to deliver a good service and banks are already capable of doing so.

These competitors are more an opportunity to provide banking customers an additional channel by using a shared platform (Such as Chase with Wal-Mart and Citibank with Staples) than real competitors.

Mobile communications

Mobile communication providers

If one thinks about it, aside from the fact that it is possible to make a phone call from a mobile phone and impossible to place a call from a payment card, there is not much difference between mobile phones and payment cards, in fact most mobile phone service providers offer the two payment options, a prepaid service or an open current account with monthly bill as do payment cards.

Pre-pay is comparable to a debit card were the user defines how much he/she wants to have in the account and the open current account is similar to a credit card

where the user first spends a desired amount and pays for it at the end of the billing cycle.

The main difference so far is that the expenses done with a payment card are diverse in nature where as the ones done with the mobile phone are limited to the mobile phone service, then the question arises, what would prevent this form changing?

As did the success of payment cards, the success of mobile payments is contingent on security, interoperability, privacy, global acceptance, and ease-of-use. Nevertheless, recent developments in mobile communication devices, color screens, greater bandwidth, and more compelling content are creating an environment where consumers have started to feel more comfortable transacting on the move.

Several mobile phone manufacturers and mobile phone service providers have started providing payment and other financial services through mobile phone devices. Nokia has developed partnerships to extend electronic banking beyond customers' desktop and in to the palm of their hands via their mobile phones, some of Nokia's partners are DBS Bank, Deutsche Bank and Nordea. Service offerings range from deposit and loan accounts balance inquiries, funds transfers, to information on issues such as interest rates and ATM locations.

By leveraging on a more advanced mobile communications network than that existing in the US, NTT DoCoMo has successfully introduced i-mode (mobile internet communications) in several countries including Japan, Germany, Netherlands, Taiwan, Belgium and France. By putting a more powerful communication tool NTT DoCoMo has allow customers to have an additional, safe reliable way to access financial services. Further discussion on how mobile communication technology could change the way we do banking will be covered in *Chapter 3, Analysis of Relevant Technologies*.

In addition, new wireless protocols, such as Bluetooth, infrared and radio frequency identification (RFID), are enabling short range wireless device-to-device payments.

There are several points of view with regard as to how these new players could come in to play in the financial (payment) services, but a fact remains, it is technologically feasible.

A threat in payment devices

Because mobile communication devices have been widely adopted and a pre-paid mobile phone service is in essence a debit account which balance is withdrawn by using the calling minutes, there is a real threat for banks payment platforms, specially for those of small denominations.

Allowing electronic payment of transactions with small denominations is not attractive for banks, nevertheless, the threat it represents is well beyond the transactions with small denominations because if the platform is put in place to enable paying \$1.25 for a bag of chips in a vending machine, there is not much difference nor effort needed to allow customers to pay \$11,000.00 for a 50" Plasma HDTV at the local Best Buy.

Chapter 3

Analysis of relevant technologies

The technologies analyzed in this chapter were not chosen at random, but rather because of their potential for changing the way most people do banking. These technologies are: Payment cards, mobile communication devices, internet, personal finance software, telematics and ATMs & Kiosks.

Payment Cards

Payment cards have been part of customers' payment options since at least the beginning of the 20th century. Large retailers and oil companies issued cards for its wealthier customers to charge their purchases in the 1920's. By the 1940's it was not uncommon to allow customers to use an ID to charge purchases, nevertheless, this form of payment cards had a limitation, they were accepted only at the locations of the issuing business or in a few cases in local group of merchants.

In 1950 Dinners Club started giving cards to customers and signing up restaurants and about a year later expanded its services to other cities around the US and to business other than restaurants, mainly retail stores and hotels. By 1954 about 100 banks were offering charge cards for their customers in their own local areas.

By the late 1950's recognizing the opportunity of combining cards and credit, Bank of America and Chase Manhattan started offering a general-purpose credit card, by the early 1960s Bank of America was the most successful card operator and in 1966 started a national licensing organization that later became VISA.

Around the same time, several other banks got together and started the Interbank Card Association that would later become what we now know as MasterCard.

Although the first ATM card was issued in 1969, it was not until the mid 1990s that debit cards became widely used for purchases, it was only then that the number of ATM/debit cardholders was large enough that merchants were attracted to enable debit

payments at their merchant locations, besides large marketing campaigns from VISA and MasterCard encouraging the use of debit cards. Now, credit and debit card purchases worldwide are estimated at \$5.7 trillion annually.

Payment cards mentioned above use magnetic stripe technology, this technology allows for data to be stored on the card in machine-readable form and has been widely used not only in payment cards but in several other uses such as identification cards, parking lot tickets, among others.

Although credit and debit card transactions have reached an estimated \$5.7 trillion a year, magnetic stripe technology has a flaw; information stored in it can be accessed and manipulated with ease by anyone with the right equipment, therefore, it is no surprise that credit card fraud is estimated to be greater than \$2 billion a year.

The early 1970s saw the emergence of a new card technology, the smart card, but it was not until 1984 that the French postal and telecommunications services successfully carried out a field test with telephone cards.

By the end of 1985 another field test conducted in Germany (also as telephone cards) demonstrated the superiority of the Smart Cards with regards to reliability and security against tampering.

It is estimated that by 1997 the number of telephone smart cards in circulation reached several hundred million worldwide and were used in over 50 countries.

Although French banks started incorporating smart card technology since 1984 it was not until 1994 that all French bank cards incorporated chips. German banks did not have a specification for cards incorporating chip technology until 1996 and was only in 1997 that many German banks issued Smart Cards. Also in 1996 Austria became the first country with a nationwide electronic purse system.

The first version of the EMV (Europay, Visa & MasterCard) specification for smart cards was published in 1994 which contained descriptions of credit cards incorporating smart card technology and guaranteed the compatibility of future Smart Cards issued by the largest credit card organizations.

Because of the technological superiority of smart cards over magnetic strip cards, it is possible for this type of cards to offer a safer and more convenient payment method. In fact, Target's VISA with smart chip technology is mostly used to receive and redeem digital coupons and incentives. Evan I. Schwartz in an article published by Technology Review in December 2002 mentioned:

"Three years ago smart cards boasted the processing power of a 1980 Apple II computer; today's versions are approaching the level of a 386-class PC, circa 1990. Most smart cards can hold 32 kilobytes of data, and their embedded microprocessors can execute simple application programs stored in 64 kilobytes of flash memory. That's enough computing power to run multiple payment, customer loyalty, health-care, and security applications on a single card."

As mentioned before, during the late 1990's another innovation in payment cards occurred. Contactless smart card appeared as a new ticketing format for public transit in several parts of the world, including but not limited to Hong Kong.

These contactless smart cards with an operating range of approximately 10 cm allows users to pay without having to remove the card from their wallets. These cards can also manage several different applications while ensuring individual security.

In late 2002 Philips and Sony unveiled a new short-range radio-frequency technology for smart cards and mobile devices, Near Field Communication (NFC) and tests are to be done by VISA. A quote of Sue Gordon-Lathrop, Visa's VP for emerging consumer environments in the Financial Times highlights the importance of this technology for the payment industry:

"[NFC] and other compelling initiatives tied to chip and magnetic strip technologies move us closer to our goal of displacing cash"

Mobile communication devices

The fast pace of today's life requires individuals to communicate at all times, that is one of the reasons why mobile communication have been widely adopted. In fact in

year 2000, it was estimated that mobile phones would be as common as television sets by the end of year 2003 and in September 2001 a study by J.D Power and Associates estimates that 52% of US households, and up to 75% of some European countries have at least one mobile phone.

It is because of this wide acceptance that several mobile-phone carriers have started customizing their offerings for diverse markets, including the financial services and it comes as no surprise that during the past several years, an estimated \$11 billion have been invested by U.S. wireless companies, to build larger and more powerful networks, in order to provide the capability of handling more voice calls plus heavy-duty data traffic sent between cell phones.

Optimistic estimates expect mobile commerce transactions to be in the order of \$50 billion and a combined total of e-commerce plus m-commerce of \$120 billion by the end of 2004.

This optimistic outlook of the mobile communications industry has attracted the attention of several industries including financial services. This interest is enhanced by the fact that Mobile-payment networks are generally cheaper to roll-out than traditional Point-Of-Sale (POS) networks and therefore present an opportunity to leapfrog intermediate technologies and going from a paper based system to a mobile system.

This wide adoption and smaller cost of roll-out is especially important in emerging markets where mobile devices have been adopted in larger scales than PCs have, (primarily due to the cost per unit) and therefore are likely to become the primary conduit of internet services (including financial services) to the mass market.

Most of the large players in the mobile communications industry as well as major players in financial services have already started initiatives to make possible for subscribers / bank customers to buy goods using their mobile phones as a payment device. Initiatives vary from enabling the purchase of a soft drink and paying for movie tickets from a vending machine to withdrawing cash from an ATM.

The process is also a diverse component of the mobile paying systems and varies from dialing a phone number to using radio frequency transmissions. There are also several choices of billing available ranging from charging the mobile commerce transactions to the monthly bills to use stored value in the telephone's memory.

Mobile consumers will most likely demand a choice of payment mechanisms: (e.g. their credit card account, their bank account, and their monthly telephone bill); therefore the fastest and more convenient way for mobile phone operators to create mobile financial services is to cooperate with one or more banks or credit card companies.

Mobile payments, as do any payment system, have to provide security, interoperability, privacy, global acceptance, and ease of use regardless of regional variations and individual market dynamics.

That is why organizations such as the Mobile Payment Forum and other cross-industry organizations (telecommunications, handset manufacturers, banks, payment companies and software vendors) emerge and provide a platform for stakeholders to discuss issues pertaining to ensuring that mobile payments meet these requirements.

Regardless of the existence of such organizations, defining a standard is not an easy task, especially due to the plethora of existing platforms such as GSM, CDMA, GPRS, WCDMA, SMS, USSD, WAP and i-Mode and the vested interests in each one of them.

Experts in the industry speculate that payments made with mobile phones will predominantly be for mobile content and applications and that paying for goods will remain a novelty.

Citibank Philippines and TD Canada Trust are among the banks that have already started offering mobile banking services and it offers a wide variety of services including balance inquiry, bills payment, funds transfer, checkbook request, statements request, list accounts as well as activation and deactivation of the service.

Mobile phone technology is not the only mobile technology that is being tested for the delivery of mobile financial services. Handheld computers provide an excellent platform for mobile banking services because handhelds have a larger screen than mobile phones, are similar in use to a desktop computer, and have been widely accepted in the US, it is estimated that in year 2001, 12 million of units were sold.

Some banks such as Royal Bank of Canada, Unibanco in Brazil, Fiducia AG in Germany have already started testing online banking services through handheld devices adding the possibility for their online customers to use a web enabled Palm handheld device to check account balances including lines of credit and credit cards; transfer funds between accounts; check balances and details of loan and mortgage accounts; pay bills and obtain up-to-the-minute account information.

Although the Palm OS platform has approximately 75% of the world market, Microsoft is championing Pocket PC operating system devices that not only offer more computing power but compatibility with Windows based PCs.

More recently several mobile phone manufacturers have introduced models of combined mobile phones and Handhelds such as the SonyEricsson P800, Nokia 6800, Samsung SPH-I330 and Handspring Treo 300, 270 and 180, therefore merging the future of mobile phones and handheld devices.

Some of the players that have done trials in the mobile commerce/payment arena among are NTT DoCoMo, Telenor, Sonera, Nokia, MasterCard, VISA, DBS Bank in Singapore, Nordea, Citibank, Royal Bank of Canada, TD Canada Trust, Unibanco Brazil and Fiducia AG Germany.

Recent developments in the industry have made WiFi (802.11 a and b) available in several locations including coffee shops, airports, libraries, parks and food courts among others. Some of the important players in this effort are Cisco Systems, Linksys, Dell, T-Mobile, Intel expect this technology to be widely adopted therefore enabling broadband internet access outside the office. These efforts are not limited to enabling the networks but also to the development of more powerful laptop batteries to ensure true mobility.

Internet

Being banking one of the industries that has more information about its clients and the Internet the “information superhighway”, experts in the industry, as did experts in many other industries, expected Internet to “revolutionize the way we did things”, physical bank branches were considered “a thing of the past”, online players were expected to dominate over traditional ones, and the estate of mind was more on the lines of “Citibank beware, e*Trade is here”. A BCG study published in March 2000 stated:

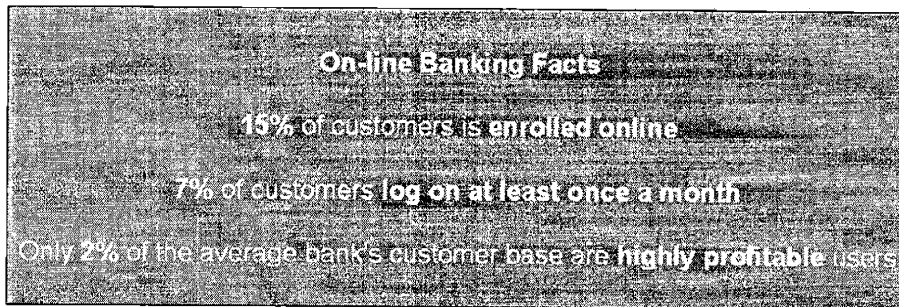
“... the opportunities are too great and the threats from newcomers too palpable. They [Banks] must do whatever it takes to make their companies leaders in the online world”

Online banking was a mean to achieve large costs reductions by offering cheaper services. It was not uncommon to have comparisons of banking transactions in different channels in the order of \$3.00 for branch transactions, \$0.78 in an ATM and \$0.12 for an internet transaction. Therefore the answer was obvious, Internet would be the preferred channel and banks should provide the platform for customers to use it.

Thus, several banks wanted to be the web portals (a la Yahoo or Microsoft's MSN), which customers would have as home pages and use them not only to manage their finances but also to shop online and read local news.

Several years after mayor UB banks invested in Internet technology, they have found that cost savings were not a “low-hanging fruit” and customers were not as eager to adopt the Internet as a preferred channel. Figure 3 shows three facts of on-line banking for 2001.

A recent report by Gardner Group discusses about some demographic component of online banking usage and estimates that although 17% of US population use online banking services, 20% of consumers with household income ranging from \$50,000 to \$75,000 use online banking and in households with annual incomes above \$75,000 usage is 29 %

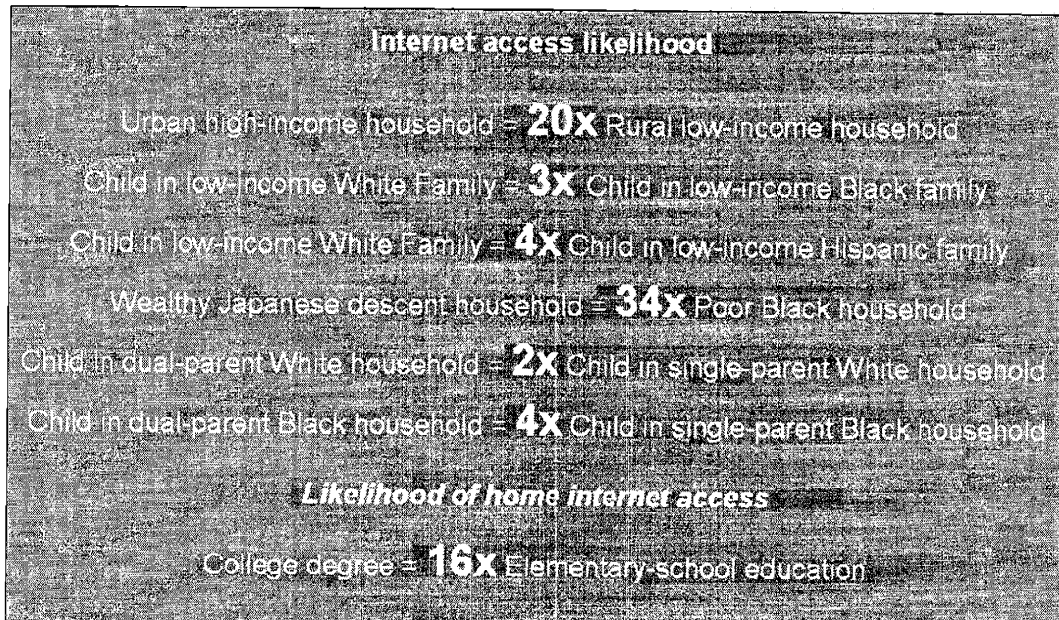


Essayan, M., Rutstein, C. & Wetenhall, P. (January, 2002), Activate and Integrate: Optimizing the Value of Online Banking, Boston Consulting Group

Figure 8

The same Gartner's research reveals that trust is another key element in online banking usage, and concludes that among customers that have been using the internet for 2 years or less, 1 in 10 will do online banking compared to 1/3 of those using the Internet for 5 or more years. Nevertheless, the research does not comment on the effects of the frequency of internet usage or familiarity with it during those periods.

When assessing internet usage is important to keep in mind that internet usage is highly dependant on demographics, education and income distribution. Figure 4 highlights a few key statistics in this regard.



Compaine, B. (2001) The Digital Divide: Facing a Crisis or Creating a Myth, MIT Press

Figure 9

One of the internet technologies that enjoyed the greatest acceptance among users is e-mail. E-mail has become a highly utilized communication tool and it provides a convenient way for banks to send timely account information.

When banking with Fleet or Citibank (among others including Sears and Target credit card holders) customers have the possibility of customizing e-mail reminders for important events in their accounts such as new statement, about to reach credit limit, payment due, etc. These e-mail reminders increase convenience of online banking and therefore encourage its usage.

But innovative companies such as PayPal (followed by Citibank's C2it and others) have gone beyond e-mail alerts and have transformed e-mail into a payment mechanism of choice for online auction sites (eBay) as mentioned in *Chapter 2, Non-financial competitors*.

Further developments aimed towards increasing Internet penetration in US households such as MSN TV (previously Web TV) that sell receivers for \$100.00 (compared to \$700.00 for a computer) and provide monthly service for \$10.00 to \$25.00 a month can provide a new source of online customers for banks (as well as other e-commerce sites).

The most valuable services that banks can offer to their online customers' convenience of accessing those services that are not available off-line. To truly enhance customer loyalty, banks should strive to not only sign customers to their online banking services but also make them active online customers.

Software agents

For some, personal finance software might seem as a mere extension of banking on-line; nevertheless, personal finance software has been around for approximately 20 years providing a platform for users to keep track of their personal finance. Recently, it has become the perfect complement for online banking services.

The best know product in the market is Intuit's Quicken that was introduced in 1984. Its latest version leverages on the power of internet and offers online banking services such as bill payment using several accounts, download bank, credit card and brokerage account transactions, scheduled automatic updates and a higher level of customization than that offered by online banking sites.

Microsoft has its own product for personal finance, Money and in the latest version offers a new function called "Background Banking" that allows users to connect to download statements from banks and brokerages, pay bills and update an investment portfolio automatically while working in other applications or while away from your desk (as does that of Quicken).

As a response to personal finance software offering services that were once exclusive to the banks, banks have started offering web based personal finance software that allows customers have up-to-the-minute balances and transaction history which might go up to 5 years for some institutions.

Fleet, among other banks, mails a printed yearly expense report to its credit card-holders as a complement to its web based personal finance software offering. This report provides a monthly summary of transactions as well as a classified analysis of expenses trough the year.

According to expert's opinion, there is no clear winner in the software offerings because each of them has their own advantages and disadvantages, nevertheless, if we take for granted that banks are better at delivering banking products and services and software developers at producing a quality software then, the best possible outcome is for the banks and software developers to cooperate for a better result for all parties.

Telematics

Imagine an automobile owner that while driving back to home decides to remotely turn-on the air conditioner in his house from a device in the car and stops at drive-thru to pick up dinner and the car transmits payment through a device that is linked to his bank account. No, this is not a reference to Batman and the Batmobile, not

Michael Knight and the Knight Industries Two Thousand (KITT) from the 1980's NBC TV series; these are just a couple of the in-car applications telematics will enable.

Estimating the average American drives a 1 ½ hour for daily commute and errands, 1 hour driving during weekends plus an average 8 hour driving long trip a year the average American would drive 450 hours a year, or calculating it another way, assuming that the average vehicle is driven 15,000 miles a year at an average speed of 35 miles per hour then the average car was driven for 428.6 hours in a year (National average according to the US Federal Highway Administration is 444 hours).

On another note, approximately 50% of the mobile phone calls are done while people are driving, which shows that people want to eliminate things from their to-do list while they drive, then, it comes as no surprise that car manufacturers (most notoriously General Motors with its OnStar initiative) are trying to do more business with customers during the time they are captive (inside the car while driving).

The use of telematics can not only enable mobile commerce services but can also help create value by providing products tailored to the specific needs of the customer such as "insurance by the mile" where insurance companies can charge a .

Fidelity Investments has already started offering the alternative of accessing their brokerage account and Employer-Sponsored Retirement Plan from their vehicle using OnStar Virtual Advisor. Among the services that Fidelity's clients can access are: current quotes on stocks, mutual funds and options, account balances and holdings, trade stocks, mutual funds and options, review order and account history, transfer funds electronically between the Fidelity account and the bank account.

With the Fidelity Employer-Sponsored Retirement Plan it is possible to review plan account balances, perform exchanges on account balances, get quotes on plan's mutual funds and investment options, access current market indexes and speak with a customer service representative.

Not everyone is optimistic about the demand for stock trading or banking services via telematics, in fact ATX Technologies which is the OnStar competitor for

Mercedes-Benz, Lincoln, and Jaguar does not. The big question is: if there is an urgent trading need that has to be solved while driving, why not just call a broker?

Regardless of how optimistic one is about the future of telematic-banking it is undeniable that there are several services that are a very good match for telematics such as an ATM locator, which can add convenience of knowing exactly where to find an ATM when visiting a city that you have not been before; receiving an early morning notification in the way to work about credit cards or loans payment due date that could help avoid late fees; the above mentioned "insurance by the mile" or drive through automatic payment.

Telematics can further help banks create a much stronger relationships with their customers by increasing the wide range of data about their customers' needs, wants and habits which provides a direct personalized marketing channel.

ATMs & Kiosks

Most of us take Automatic Teller Machines (ATMs) for granted, where ever we go there seems to be one. Nevertheless, it was not always like that, in fact, the first ATM working prototype was installed in a New York based Chemical Bank in 1969. It took five million dollars to develop it and it only had cash dispensing functionality and money was not automatically withdrawn from the accounts, so banks had to be very exclusive on who to give ATM privileges to, mainly credit card holders with good records.

Credit cards had to incorporate a magnetic stripe for account information to be included because ATMs. Despite the fact that even its creators foresaw it as a machine that would do most banking transactions, it has taken more than 30 years for the approximately 325,000 ATMs in United States to be much more than a cash dispenser and took them more than 20 years to be truly interoperable between different banks.

Now some banks' ATMs allow their customers not only to withdraw cash but also make deposits, pay creditcards, pay mortgages, adding credit to their pre-paid wireless phones and buy stamps among other services. A subsidiary of Citigroup in Moscow will

install ATMs, internet kiosks and CitiPhone telephone banking facilities in all British Petroleum locations across Moscow.

Because of the cross-selling opportunities ATMs provide, experts are eagerly waiting for the arrival of the next generation ATMs or internet enabled kiosk that will allow customer to self serve. Take for example prepaid wireless phone users, an estimated 12% of the 130 million wireless users in US are on prepaid plans, what else can banks sell to them?

Another example of ATM-type terminals is Fandango.com which not only provides the possibility of buying movie tickets on-line and pick them up in an ATM-type terminal in the lobby of the movie theater using the same credit card used online as an identification, but also to buy movie tickets at the terminal once in the lobby of the theater instead of standing in line waiting for the clerk.

Besides the traditional ATMs, there have been several attempts to introduce self service kiosk in shopping malls, airports, and other public places. The services offered by these kiosks include directory services for the malls and ticket sales and in some countries such as Mexico, they even include internet access (Telmex).

Videoconferencing

Videoconferencing technology is not new, in fact, the first picture phone system was build as a test by AT&T in 1956 and although many of us to have participated in a videoconference at least once, it is highly likely that the quality of transmission was less than perfect, even so, quality of image has continue improving.

Now using videoconferencing together with online data sharing has allowed people in several contexts to reach agreement faster than using e-mail, faxes or phone calls while reducing travel cost and lost productivity which are increasingly important in a recessionary economy.

Because quality of video is strongly dependant in the speed of transmission and the later can be improve by the degree of compression and the size of the channel

through which video is transmitted, development in these two areas would allow for videoconferencing to be used more widely.

That is why broadband is such an important technology for the future development of videoconferencing systems. A study predicts that by 2005 50% of all U.S. Internet subscribers will enjoy broadband connections. Among the broadband offerings, the two most widely known are Cable and DSL.

Cable has the inherently better technology; nevertheless, in practice it is just slightly better than DSL. The most common DSL offering is ADSL (Asymmetric) but there is also a Symmetric DSL where the upstream and downstream bandwidths are balanced therefore making it useful for applications such as videoconferencing or Web hosting.

Eventually, DSL providers will also have a limited offer of Very High-Speed DSL which is capable of speeds between 3 and 20 megabits per second, enough bandwidth for video-on-demand services. One such offering is that of Qwest in the Phoenix area, but such networks won't be widely available for another decade and most likely cable modem networks should be running at similar speeds.

Satellite broadband offerings required the use of a phone line for the upstream, nevertheless, 2-way broadband are now possible with services such as Hugen's Directway and Microsoft's StarBand.

Another development that will most likely help increase the use of videoconferencing is broadband wireless metropolitan area networks such as that of HALO Network developed by Angel Technologies and the Stratospheric Telecommunications Service by Sky Station.

Sky Station plans to fly a fleet of 250 huge dirigibles above major cities, providing 2- to 10-megabit-per-second connections. Using the 47-gigahertz spectrum, each geostationary, solar-powered blimp is designed to hover at an altitude of 21 kilometers, providing service to over 100,000 broadband users spread over 19,000 square kilometers.

The HALO Network, planned by Angel Technologies in partnership with Raytheon, is testing high-altitude planes that would circle major metro areas at the height of approximately 60,000 feet, offering two-way communication ranging between 1 and 12.5 megabits per second.

Another one is Teligent's point-to-point digital microwave services that offer much high frequency ranges, AirFiber, Terabeam and other companies provide free space optics (FSO) and hybrid FSO/radio (HFR) fixed wireless communications services that can potentially offer bandwidth in the hundreds of megabits per second upstream capacities.

Similar to cellular technology, these fixed wireless services deliver much higher bandwidth than mobile broadband services because the system does not have to track down a moving target and because the receiver is more powerful than a cell phone's.

3G services will begin offering mobile bandwidth of up to 384 kilobits per second which may not be much, but those same 3G transmitters also can serve fixed receivers with up to 2-megabit-per-second service, therefore, if demand for mobile broadband is not as high as expected, 3G providers may switch to the fixed-access market.

On the file compression side, developments such as 3ivx of Happy Machines that would reduce file sizes helping reduce streaming loads and therefore allowing for improvement in web-cam and videoconferencing transmissions while also enjoying the security of strong encryption.

These technological developments are extremely good and will provide firms a way to save on traveling expenses, however, still, most people clearly prefer working face to face. That is why some companies such as Teleportec have started developing 3D and holographic displays, with the idea in mind that the enhanced "presence" of remote individuals when face-to-face meetings aren't possible.

Imagine a holographic image of your bank's financial advisor being projected in your office a la Star Wars to discuss with you mortgages, investment options or any other financial product or service regardless of the distance between your office and

his/hers and without any of you ever have to leave your offices. Teleportec in partnership with eye-c Ltd are working to bring a new dimension to the business of financial services with the idea in mind that data sharing capabilities can also allow mortgage or loan applications to be viewed and discussed in real time.

Conversely, using the current Teleportec technology, if a speaker gestures too quickly or moves out of lens range, it will appear to the audience as if parts of the speaker's body have vaporized.

From a technological standpoint, "building" a holographic image remains a long, complicated, and expensive process. For example, holography is exceedingly memory-intensive: a high-quality, 20-square-inch hologram may consume over 1.2 terabytes of data, so it will require some time before the technology becomes commonplace.

A technology with less image quality is use among those communicating with family and friends through Yahoo! instant messenger service and a \$20.0 web cam, and a more recent offering in the market is a videoconferencing system from D-Link for \$300 which most likely increase the use of such systems.

Because of their consequences in videoconferencing and its variations, it will be particularly interesting to follow future developments in broadband roll out such as 3G and WiFi and others.

Voice Recognition

In recent years, it is highly likely that most of us had made a call to a customer service representative at a bank, airline or hotel and received an answer such as "please dial or say your identification number" and it is this system's ability to understand the numbers we have said that we refer to voice or speech recognition.

Although speech recognition is simply the process of converting spoken input to text and is often referred to as speech-to-text, this chapter will also include other sister applications of this technology such as Text-to-speech, Speaker recognition and VoiceXML.

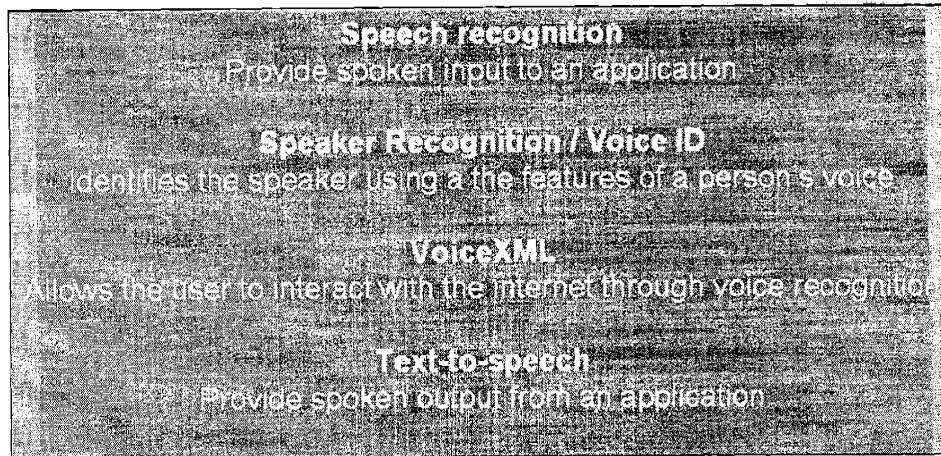


Figure 10

Speech is the “natural” way of communication and for most people talking is faster than typing, that is why it comes as no surprise that several futuristic movies and TV series such as “*2001: A Space Odyssey*” and “*Star Trek*” have featured human-computer conversations.

By enabling call centers with both text-to-speech and speech-to-text technologies, companies have not only reduced the need for human customer service representatives while providing a “human-like” interaction for customers but also are able to comply with the customers’ need for answers to their questions 24/7.

A study by Jupiter published in April 2001, estimates the largest call centers can reduce call expenses by approximately 50% of what traditional phone interactions cost by implementing Automated Speech Recognition (ASR) technologies.

Enabling computers to understand and “speak” a limited number of words is not the only speech application being use, in fact, one of the most promising ones is voice identification or speaker recognition. These biometric applications can authenticate, identify, classify and/or differentiate a person by comparing his/hers voice features.

The difference between speech recognition and speaker recognition is that the later focuses on the voice attributes of the person instead of what he/she is saying.

As one can imagine the use of a person's voice to certify they are who they claim to be has an ample use in financial services, in fact, a company named Domain Dynamics is putting voice templates on smart cards, to allow users authenticate transactions using their voices.

The combination of these two technologies is often referred as total voice solutions as it enables a person to interact with automated systems by just using his/her voice.

Most often than not, authentication is done prior to transferring a call to a call-center agent, nevertheless, trials have been made to authenticate callers as they speak with the call-center agent, as a background operation.

There are three ways in which users can interact with speaker-authentication systems, by using a pre-determined word or phrase such as a password or numeric ID (*text dependent*), by using a random combination of pre-determined words or sentences (*text prompted*) and by using the person's free-flow conversation (*text independent*).

Each of these approaches has their own advantages. By using a password or ID, text-dependent approach becomes a strong authentication combining biometric security with something the person knows, whereas the randomness of text prompting increases a system's resistance to tape-recorded attacks. Text-independent technology is often use in tandem with one or both of the other approaches.

Another technology is taking speech recognition further is VoiceXML. VoiceXML is the result of pulling the efforts of several companies towards voice-enabled internet that got together in 1998 to form the VoiceXML Forum with the mission of defining a standard dialog design language that developers could use to build conversational applications.

In 2000, the VoiceXML 1.0 was submitted to the W3C as the basis for the creation of a new international standard and shortly thereafter input from W3C member companies as well as that of other W3C working groups, and the public was incorporated into VoiceXML 2.0

With VoiceXML you could one day talk to your Car, Handheld, PC or any other web-enabled device asking something like "savings account balance", to which the bank's application would reply "two millions, five hundred seventy-seven thousand, four hundred eighty one dollars and thirty six cents." (or maybe a little bit less).

Development of speech recognition technologies are not limited to PCs and laptops, in fact, several research efforts such as project Oxygen at MIT are investigating the use of PDAs and other handheld devices to increase mobility to speech-recognition and identification systems.

Furthermore, a combination of visual and voice functionalities will increase the system's attractiveness and ease of use. Say for example that you are visiting a city for the first time and you realize that you do not have any cash in your pocket, then, you ask to your car's on-board computer to locate the closest ATM.

If the car's computer gives you spoken directions you might need for them to be repeated, nevertheless, if your car's computer displays the findings in the in-dash display and limits the voice response to something like "*the closest ATM is 1 mile north*" the same output will be more useful.

The existing voice applications still require further development and should be used together with other technologies, nevertheless, the advantages they present are large and ubiquity of such systems will drive consumer acceptance.

Chapter 4

Security and Privacy Concerns

As mentioned in chapter 1 when discussing information management, security and privacy are two extremely important issues to take into consideration in the delivery of banking products and services.

Before continuing any further, it is important to have a common definition of both of these terms, security refers to the measures needed to ensure being safe from the threat of theft or sabotage, and privacy refers to the freedom from unauthorized intrusion.

An example of both terms should help clarify the concepts; issues of fraud, such as that of credit card fraud, identity theft among others are part of the security concerns; issues related to the ability (or inability for that matter) of paying without anyone knowing who the payee was are part of the privacy concerns.

Banks are no strangers to privacy and security issues; in fact, it is not uncommon to be able to read a bank's privacy policy and a security statement in their websites. The document will now proceed to discussed both of them separately, first security and then privacy issues.

Security

A lot has been said in the media about the possibility for third parties to "hack" in to a system and steal money from banks, merchants and customers. In the summer of 1999 criminals were able to get access to Citigroup's system and make two multimillion dollar transfers (\$22 and \$15 million respectively).

An estimated 2 billion dollars were lost by the credit card industry to credit card fraud in 2002⁷⁰. Credit Card fraud takes various forms such as skimming, mail intercept, spoof sites, and identity theft. A disproportioned number of these frauds were done through the internet.

These numbers reinforced by stories as that related by Daniel Akst in a Technology Review article in September 1999 discussed the importance of security of transactions that make customers concerned about security of transactions.

“... the woman who stole my wife’s identity. She started by stealing her wallet. Despite my wife’s prompt notifications, the thief used the credit cards, passed a number of checks and adopted her victim’s name as an alias.

For a long time thereafter, merchants required elaborate proof to accept my wife’s checks, and several years after the initial theft, she was rejected for phone service by a new provider because, the company said, she had a large outstanding balance, generated, of course, by the crook.”

Although consumers aren’t typically liable for fraudulent use of their credit card numbers, an estimated 50% of consumers consider credit card security to be a major inhibitor to the growth of mobile and electronic commerce.

Some of the initiatives that have been undertaken to overcome these forms of fraud include ID verification technologies such as bio-identification and pin-based initiatives, encryption, neural networks and rules-based systems, and education as discussed later in the document.

Identity verification technologies

There are several initiatives that have been analyzed with this respect; one of the more pervasive ones is the creation of national identity card. A lot has been said about having a national identity card in the United States like several other countries in the world.

The “de facto” identity card has been so far the driver’s license but efforts are under way to make it official. Although for several years Americans have rejected the idea of having an obligatory identity card (for privacy concerns that we will discuss later in the document), events such as the one on September 11, 2003 have changed Americans’ receptivity to the idea.

Drivers license are not the only identification cards that have tried to incorporate additional identification technologies, in fact, the U.S. Department of Defense has started issuing a “common access card” to the members of the armed services. These cards include a photograph and a microchip to authenticate the card-holder's identity every time he/she enters a facility or logs onto the computer network.

Another possibility for identity cards is to incorporate biometrics data such as fingerprints and “digital faceprints”, which would allow the automatic monitoring of checkpoints.

Unfortunately, although fingerprints are unique to every person, similarities can make it difficult for existing devices to match them correctly and thus fail an estimated 5% to 15% of the cases. Customers' would easily get annoyed if a “computer mistake” denies them the right to purchase their groceries.

Experts in the field have stated that the best way to identify a person would be to incorporate three different pieces of information in the identification method, something that you have (i.e. a card), something that you are (biometric information such as fingerprints, eye scan or faceprints) and something that you know (e.g. a password). This will greatly enhance security.

Encryption / Cryptography

Encryption is the process of scrambling data to protect it from being read by people other than the designated receiver. And it is precisely this protection that has spurred the debate about encryption. Some governments fear that providing excessive protection will not only help those conducting business through the internet and other means, but also will allow criminal transactions to be “invisible” to the government agencies eyes.

There are several types of encryption private key encryption, public key encryption and more recently, still in development stage, quantum encryption.

Public-key encryption systems are commonly used in business and have not been cracked. Nevertheless, these systems are strongly dependant in the computer's computational power. Public-key encryption will eventually be cracked.

As one can image the strength of the "lock" will be worthless if everyone has access to the key to open. Quantum cryptography transmits the key in the form of photons whose polarization varies randomly. The sender and the intended recipient will compare polarizations, photon by photon and, because any attempt to tap this signal will alter the polarizations in a way that can be detected by the sender and intended recipient They can keep transmitting new keys until one gets through without disturbance.

Neural networks and rule-based systems

A neural network is a massively parallel distributed processor that has a natural propensity for storing experiential knowledge and making it available for use. Neural networks can be best put to use in any situation where there is a need to develop a model, either for classification or time series prediction.

A rule-based system are little more than a set of if-then statements that combine a set of assertions and a set of rules that specify how to act on the assertion set. Rule-based systems provide the basis for "expert systems" which intent to encode the knowledge of an expert into the rule set expecting that when exposed to the same data, the expert system will react in a similarly to how the expert would.

These types of systems are used by credit card and electronic payment companies to monitor and "learn" from consumer patterns and avoid authorizing transactions that are out of the client's consumption pattern.

Although these systems are very good at manipulating information they can not be left alone and have to be complemented with customer service staff that will allow for the exceptions to be made on time and as seamlessly as possible for the customer.

Education

Education on security and privacy matters does not refer to going back to school; it refers to raising awareness of the potential risks of fraud or theft that everyone is exposed as the result of doing payment and other banking transactions.

Several banks provide guidelines and suggestions to their clients on how to avoid fraud. It is not uncommon to receive a new credit card with several flyers with suggestions about careful use of the credit card and how to avoid fraud.

Companies such as CreditNotify offer account monitoring services with monthly report. Their sales pitch is, *“if you know how your credit history changes over time you will be able to stop identity theft soon, if you don’t, God knows when you will learn about it, maybe when it’s too late”*

To the extent possible, it is important for banks to be on the minds of their customers not only as the institution providing the platform for the transaction but also the place to look for information of potential fraud risks.

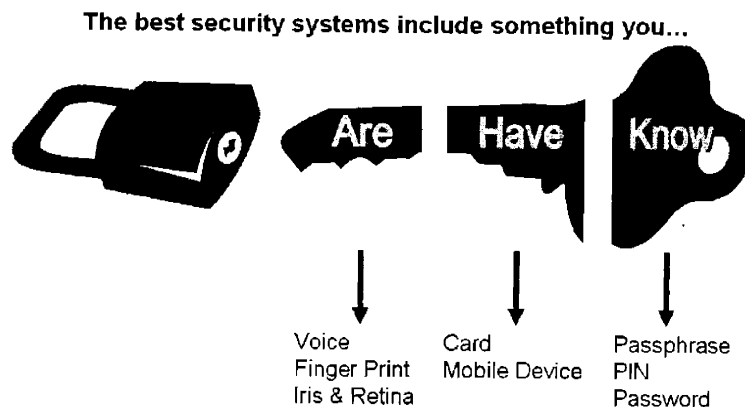


Figure 11

Clients not only want a “no liability” policy for fraudulent expenses on their accounts but are willing to take additional precautions to avoid the need of having to go through the complaint process in order to get reimbursed and therefore will appreciate information on how to avoid it in the first place.

Privacy

Not all customers feel happy about having a store recognizing them, greeting them by name, remembering previous purchases and issuing individualized coupons based on consumption patterns, they feel their privacy has been invaded.

Many people feel awkward having to call MasterCard (or VISA for that matter) and let them know that he/she will be out of the country for certain time and will expect their credit cards to be authorized for transactions done there but if they don't, paying for their first transaction in the other country would take them about a half an hour and will most likely have to talk to more than two bank representatives, but, if one thinks about it, how else can a credit card company prevent fraud if they do not monitor the customer's spending behavior?

Banks have a large amount of information that they collect about their clients from the day to day transactions and it could be used for security purposes. However, there is a tradeoff between security and privacy and customers need to choose.

Another problem with electronic money is that one of the characteristics of physical money anonymity, because one can buy a book with cash and there is will be no record of who did the purchase, so far this is not with most digital money, only a limited number of prepaid smart cards such as that use for phones in some parts of the world have that functionality. In this sense digital money behaves more like a check than a bill or a coin.

Chapter 5

Putting it all together

Banking will no longer be constrained to a single channel. Customers have diverse interests and needs, and they like having alternatives. There is also no single dominant technology to which all banking products and services can be switched.

Technological developments are impressive and must be taken into consideration too but one must not expect a “miracle” to happen over-night and things should be put into perspective, for example, although PayPal achieving 200,000 transactions per day in 2001 is impressive, but VISA processed 200,000 aggregated transactions per minute during the same period⁷².

This is not to say that PayPal's achievements are not impressive (its transactions are equivalent to approximately 5% of e-commerce transactions) but it is important to understand that its business model has limitations and one should not be blinded by its success.

This chapter is divided into three parts. The first part discusses general warnings and cautionary notes related to future technological developments in the banking industry. The second part presents a system dynamics model intended to identify the key aspects that influence customers' adoption of a new banking platform. The third introduces a potential scenario reflecting prospects of the banking industry in the near future, analyzing players, channels, products, services and employment.

Important Considerations

There are 2 key elements of banking from the customers' perspective, 1) Trust (Security and Privacy) and 2) Cost/Benefit ratio both of which be discussed in further detail in this chapter.

Trust

Since banking requires employees to deal with others' money and sensitive information, trust is a particularly important element in the bank/client relationship.

No sensible customer will deposit their money or give personal information to an institution that can not be trusted, either because transactions are conducted with doubtful security or because "anyone" can access customers' personal records at will.

Brand is a trust-enhancing element which can be used to the banks' advantage. Customers are more willing to deal with well-known brands with a good reputation of delivering quality products and services. Brands also allow customers to identify trustworthy parties even in unfamiliar places and therefore become an element of continuity in a discontinuous environment.

The relationship between brand and trust does not necessarily mean that only large banks will succeed, in fact, in certain communities and for certain type of customers, it is most likely that the local or regional banks will be better positioned than the large national banks to serve customers' needs.

It then comes as no surprise that Visa, MasterCard, American Express and Discover have spent billions of dollars building up trusted brands through advertising and marketing campaigns. They also have raised the barriers to entry for new competitors by increasing customers' expectations of a well-trusted payment device.

Cost / Benefit (convenience)

The pace of modern society forces consumers to seek convenience and expedience in all aspects of their lives. Customers prefer banks with institutions conveniently located across a broad geographical region. Additionally, they have come to expect remote access to banking information, balance statements that are sent on a regular, reliable schedule, and facile communication with customer service representatives.

The “coolness factor” is not as strong in banking / paying platforms as it could be in entertainment, gaming, fashion and other industries. Instead banking customers give great value to safety and ease of use. Therefore, banking services should be designed in a manner that allows them to adapt to the customers way of life and not the other way around.

One might expect customers to keep using checks and/or cash if using electronic means does not add any convenience and even worse if electronic means represent an additional inconvenience. This is particularly true in a dispute; customers want to solve their problems quickly and seamlessly.

Customers have no incentive for customers to learn to use a new platform if there is no tangible benefit from learning to use it. So, if learning to use a new channel is “natural” to the user; it creates an incentive to learn it because it will be easy to do. Following are that illustrate the online banking experience.

First, banks wanted to convince customers to use online banking when those customers did not even have access to the internet. This process was as “unnatural” as it could possibly be since it not only required the customer to learn a completely new banking channel but it also required customers to utilize a new channel that lacked their trust in every sense.

The second example relates to the poor design of banks’ websites. The sites which were mostly designed by technical experts for technical experts, and did not recognized the fact that the average customers are not technical experts or, for that matter, are not even technology enthusiasts.

Not until this flawed websites were up and running did banks realize that a banking website must be understandable to its customers not only to its technology experts. They also realized that although it is good for the website to have many capabilities, it is bad idea to present every service that the online banking channel offers on the first page. Such presentation is overwhelming, and daunting, and discourages customers from using the functionalities rather than encouraging them.

Considering that an in-branch transaction costs \$3.00 and an online transaction cost around 12 cents⁸⁹, it comes as no surprise that banks are eager to have their customers switch channels but customers do not necessarily want to make the switch. In fact, bank outlets still generate approximately 80 percent of new deposit, investment, and loan accounts and an estimated 80 percent of consumers visit a physical outlet at least once a month⁸. Therefore, banks should aim at presenting their clients with the “added convenience” of online channels instead of adding inconveniences to the physical channel.

Considering that it is already easier to gain information than it is to know which information is important, banks can also add convenience for their customers through electronic banking channels by serving as quality filters for financial information.

Information has given banking customers three important pieces of learning: 1) they can compare bank offerings more easily; 2) they are now aware that their money is important for banks and that they make a profit out of managing it; and 3) they are also aware that banking online is cheaper for banks. It is then logical that banking customers will look for the best available deal and will apply for a credit card that has the best fees/rewards combination for their needs. This does not mean that customers will always open an account with the bank just because it is the cheapest one or the one with the best interest rates. Rather it implies that they will look for the bank that provides a cost/benefit ratio that is acceptable for them. This provides two important opportunities for banks, sharing cost reductions with their clients and increasing the aforementioned conveniences.

It is not intuitive why banks charge for online banking if it is widely known that it is a cheaper channel for the delivery of banking products and services. So far banks have used the wrong strategy of charging a fee for using the channel instead of charging a fee (or requiring minimum balances) for particular services. To illustrate this point one should consider the next questions. Would you bank with an institution that charges for visiting the branch? On the other hand, does your bank require you to have a minimum balance for your checking account? To have direct deposit to wave fees? To make a minimum payment to avoid late fees?

It is the same with online banking. It is just another channel for delivering products and services and banks should not charge to use it, rather, they can charge for the particular products and services as their clients can identify particular benefits from them and will therefore be willing to pay for them.

Another way to improve the cost/benefit ratio is by leveraging on banks' knowledge of their customers' financial behavior, developing better and cheaper ways of serving their needs and focusing their efforts on strengthening relationships with their most profitable customers, often the most affluent and educated customers. These strategies will not only help banks and customers achieve cost savings but also providing their customers with the highest benefit.

Banks should aim at providing their clients with the most convenient service at the least cost for the bank not the cheapest services with the least inconvenience. This could be achieved by providing "self-service" tools for less profitable customers and highly customized services for more profitable segments.

It is highly likely that traditional business models will change and banks will be forced to look for new sources of revenues. E.g. banks earn \$60 billion annually from the interest rate float, from the spread that low-interest checking accounts afford them, and from the fees, with electronic payment methods, some of these earnings will no longer be possible.

System Dynamics Model

On average customers are slow to adopt new financial services channels. It took approximately 30 years for credit cards to be as widely accepted as they are in the United States. Therefore, although the Federal Reserve will stop processing checks at 13 of its 45 sites around the country -which could be taken as an indication of the decline of check writing-, one should not expect for check processing to disappear next year. In fact, checks still account for approximately 60 percent of all retail non-cash payments, according to Federal Reserve data⁷⁸.

While having an increased user-base for a certain service allows banks to receive more feedback from it and make this product or service more attractive for merchants, it is worth noting that an increased user base alone is not necessarily good. In fact, the credit card industry has seen a rapid rise in credit card debt write-offs because of the increased number of transactions customers do to earn rewards.

To better illustrate the elements that affect the adoption of a new banking platform, figure 12 presents a system dynamics model containing the key elements influencing this adoption. It is important to keep in mind, that, as with most system dynamics models, this model does not include an exhaustive list of elements. It presents what the author considers to be the most salient ones.

This model not only pictures the effects that elements such as trust, convenience and cost/benefit have on the adoption of a new platform, but it also pictures the secondary elements that have an effect on them.

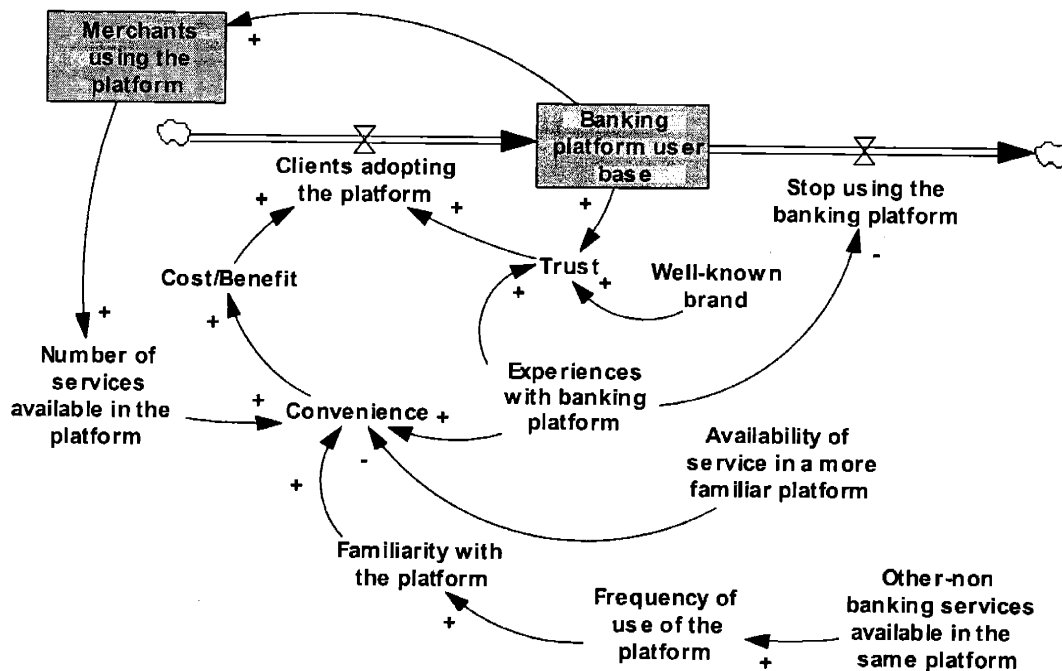


Figure 12

As one can see from the diagram, the banking platform user base will have a direct relationship with the number of clients adopting the platform and an inverse relationship with the number of those that stop using such a platform. On the other hand, more people will adopt a new banking platform if it gains customers trust and achieves a desirable cost/benefit ratio.

As discussed previously, among the elements that improve customers' perception of cost/benefit are those increasing their convenience. Such elements include customers' familiarity with the platform, an increased number of services available in the new platform and positive experiences with the platform. On the other hand, the availability of the same services in a more familiar platform discourages customers from learn to use a new platform.

Trust is enhanced by a well-known brand, good experiences with the platform and word of mouth effect from an increased user base.

Banking, the Near Future

Society is becoming increasingly dependent upon electronic transactions for conducting business. Online channels have more a profound influence on consumers' offline behavior than ever before. Still it is unclear how all this will play out in the near future in an increasingly multi-channel world.

To provide a picture of what the banking industry will look like in the near future, the next section will be divided into four sections analyzing players, channels, products, services and employment.

Players

As was apparent from the data presented in the industry analysis, the banking industry is undergoing a strong consolidation trend that will continue although on a smaller scale. Banks will keep looking to become large national banks with branches in every state providing them with the opportunity to leverage on their existing back office operations and further decreasing the need for people in these and other areas.

Some small local and regional banks will become interesting acquisition target for the larger national banks to increase their reach. This consolidation trend will not only allow banks to reduce their cost but will also benefit customers by providing them with a larger and more convenient network of bank branches and other banking channels for their use as well as an enlarged variety of banking products and services.

The presence of global players such as Banco Bilbao Viscaya Argentaria (BBVA), Banco Santander Central Hispano (BSCH) and others will increase. In fact, such institutions have already started looking for banks to acquire in the US/Mexico border region as an effort to participate in the increasingly profitable business of sending money to emerging economies such as Mexico, Central America and South America.

By expanding their networks, large banks will not only leverage on their back-office operations and economies of scale but will continue improving their brand positioning. They will therefore gain customers' trust and this will allow them to convince customers to use other banking platforms.

It will not be uncommon to see banks cooperating with other service providers or software developers to increase the range of products and services that they can offer to their clients. Therefore, although banks might risk not having a differentiated online banking offering by partnering with software developers, it will also give them the opportunity to leverage the software expertise of the developers, to provide a better platform for customized reports to their customers, and to benefit from feedback not only from their clients, but also from customers of all banks that cooperate with the selected software developers.

Channels

Eventually, banks will use ATMs more like an intranet banking enabled kiosks with cash withdrawal and smartcard recharging capabilities than what they are now. By providing these online-banking capabilities in ATMs, banks will help reduce customers' concerns about third parties hacking into the system and monitoring their transactions,

as transactions done in these intranet kiosks will only use the bank's proprietary network.

ATMs will, among other things, allow customers to buy products and services such as calling cards (or long distance minutes), mobile phone prepaid minutes and stamps, and may even allow customer to recharge electronic wallets and besides paying bills.

Mobile communication devices have good potential in the banking industry, nevertheless, banks should be extremely careful in their mobile services deployment as a failure in these channels would produce a strong negative effect in the customers' mind and that could be hard to overcome even if technology improves.

Telematics provides a very good opportunity for a bank to be "reachable" and provide convenience to their customers. Indeed, it is very unlikely that anyone would place the "trade of the millennium" while driving but it could be convenient to be able to check a credit card balance while going to a restaurant with a client and avoid having the waiter return and say "sorry sir, unfortunately the system did not accept your card".

Other banking services that can be enable by telematics are ATM or a bank branch locator, voice reminders about payment due dates and being able to pay a road toll or a drive-thru without even touching one's wallet.

It will be particularly important for any new channel a bank decides to introduce to first effectively integrate the channel with traditional ones in order to significantly increase its usage. Only then will they be able to make the most out of cost reduction, cross-selling opportunities and higher retention.

Products and services

The mobile communication device of the near future will likely be some sort of Phone/PDA combination. Therefore it is important to allow for more customization in online banking web sites in order to make it convenient to browse with the small screen of such devices so that they can easily show relevant information to the particular user.

Another important element of payment systems is smart card / RFID capabilities. This technology is not only restricted to plastic cards -such as those used by metro systems around the world- but, the possibility exists to also include these capabilities in mobile communication devices.

By enabling payment devices with smart card / RFID capabilities, banks provide their customers with the possibility to use them as electronic cash, credit and debit devices. It is important for banks to keep in mind that cash payment devices need to allow for no transaction history to be kept anywhere, whereas credit and debit payment devices cards may allow their clients to enjoy the full functionalities of smart cards such as reward programs and personalized information.

Having several payment systems in one single device, will have the added convenience for the customer of going shopping with just one card in his/her wallet instead of having one card for every store he/she will visit.

The added convenience for merchants and issuers is that customers will always have their card with them and most likely pay with the proprietary card therefore providing more information for cross-selling opportunities and personalized marketing. Merging many payment devices into one requires merchants to forget about the widely accepted knowledge that if customers carry a card with the merchant's name on it they will be reminded of this merchant.

Another important consideration for any future new product or service is customization. Customization should occur in several dimensions. In the future, it will not be uncommon to see varying levels of security based on the type of transaction, the amount of the transaction, the parties involved and the platform used. This is not much different from the fact that an individual would be more careful when opening his wallet to buy a Hot-dog on the street in Mexico City than he would be when paying for a pizza in the privacy of his own apartment.

It is also important for customers, issuers and merchants to be able to customize the desired level of information sharing they want to allow and the parties with whom they wish to share such information.

Employment

As consumers replace their checks with electronic transactions, banks will decrease the need for tellers and back-office personnel. If one considers that administrative and support jobs constitute two out of three jobs in banking and tellers are the largest individual banking occupation -nearly one out of every four jobs-, one can imagine the large savings bank will achieve.

The reduction in banking employment will not only be due to technology itself but will also be affected by deregulation and mergers which have created the appropriate environment for the consolidation trend that the industry has been part of in the past several years. Bank branches will not disappear in the near future but will be reduced in size and banks will keep on giving incentives for increase use of electronic means.

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Exhibit 1

CHANGES IN NUMBER OF INSTITUTIONS

United States and Other Areas

Year-to-Date Activity, 1934 - 2001

| Year | Total Additions | Total Deletions | Banks at Year End |
|------|-----------------|-----------------|-------------------|
| 2001 | 146 | 381 | 8,080 |
| 2000 | 215 | 481 | 8,315 |
| 1999 | 252 | 445 | 8,581 |
| 1998 | 218 | 587 | 8,774 |
| 1997 | 243 | 630 | 9,143 |
| 1996 | 194 | 606 | 9,530 |
| 1995 | 139 | 649 | 9,942 |
| 1994 | 67 | 575 | 10,452 |
| 1993 | 73 | 579 | 10,960 |
| 1992 | 83 | 544 | 11,466 |
| 1991 | 141 | 561 | 11,927 |
| 1990 | 189 | 557 | 12,347 |
| 1989 | 201 | 623 | 12,715 |
| 1988 | 232 | 818 | 13,137 |
| 1987 | 256 | 743 | 13,723 |
| 1986 | 288 | 495 | 14,210 |
| 1985 | 376 | 455 | 14,417 |
| 1984 | 440 | 413 | 14,496 |
| 1983 | 383 | 365 | 14,469 |
| 1982 | 325 | 288 | 14,451 |
| 1981 | 198 | 218 | 14,414 |
| 1980 | 206 | 136 | 14,434 |
| 1979 | 207 | 234 | 14,364 |
| 1978 | 151 | 171 | 14,391 |
| 1977 | 160 | 159 | 14,411 |

Source: FDIC