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*Innovation in Retail Banking*

by  
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# Innovation in Retail Banking <sup>1</sup>

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Abstract: How does a retail bank innovate? Traditional innovation literature would suggest that organizations innovate by getting new and/or improved products to market. However, in a service, the product is the *process*. Thus, innovation in banking lies more in process and organizational changes than in new product development in a traditional sense. This paper reviews a multi-year research effort on innovation and efficiency in retail banking, and discusses both the means by which innovation occurs along with the factors that make one institution better than another in innovation. Implications of these results to the study of the broader service sector will be drawn as well.

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## 1. The Innovation Challenge in Financial Services

Financial services comprise over 4% of the Gross Domestic Product in the United States as well as employing over 5.4 million people, more than double the *combined* number of people employed in the manufacture of apparel, automobiles, computers, pharmaceuticals, and steel<sup>2</sup>. While impressive, these numbers belie the much larger role that this industry plays in the economy (Herring and Santomero, 1991). Financial services firms provide the payment services and financial products that enable households and firms to participate in the broader economy. By offering vehicles for investment of savings, extension of credit, and risk management, they fuel the modern capitalistic society.

While the essential functions performed by the organizations that make up the industry (the provision of payment services and facilitation of the allocation of economic resources over time and space) have remained relatively constant over the past several decades, the structure of the industry has undergone dramatic change. Liberalized domestic regulation, intensified international competition, rapid innovations in new financial instruments, and the explosive growth in information technology fuel this change. With this change has come increasing pressure on managers and workers to dramatically improve productivity and financial performance. Competition has created a fast-paced industry where firms must change in order to survive.

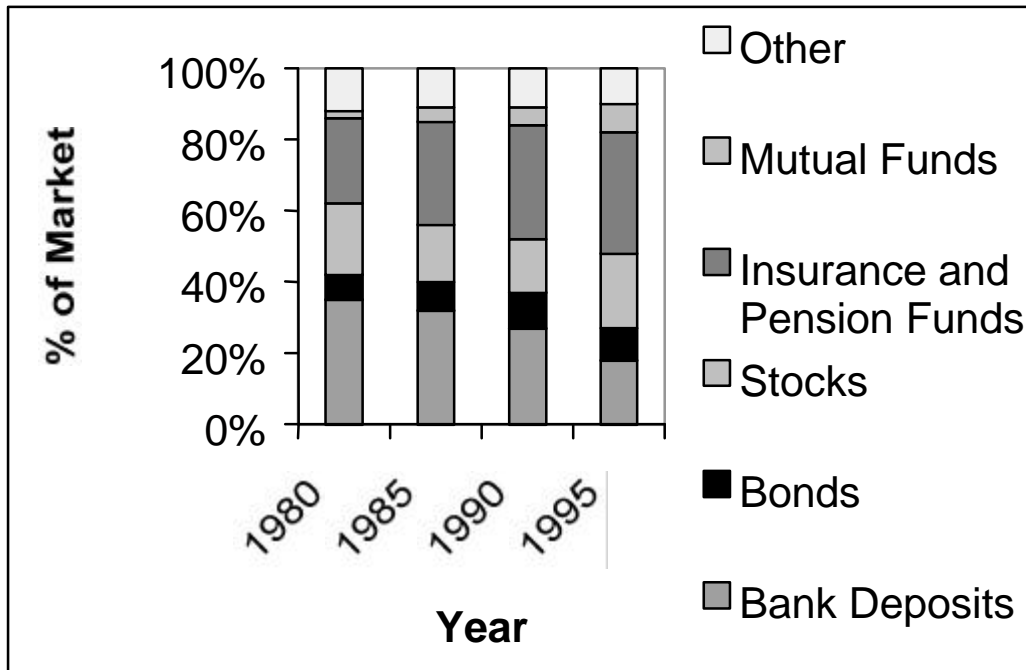
Nowhere is this force of change felt more strongly than in retail consumer financial services. Once the sole domain of the bank, mutual funds, brokerage firms, and other non-bank competitors have continued to enter into these markets, eroding the market share of the traditional banking sector. Consider the changes depicted in Table 1.

**Table 1. Changes in the U.S. Banking Industry 1979-1994<sup>3</sup>**

<b>Item</b>	<b>1979</b>	<b>1994</b>
Total number of banking organizations	12,463	7,926
No. of small banks	10,014	5,636
Real industry gross total assets (Trillions of 1994 dollars)	3.26	4.02
Industry assets in megabanks (percent of total)	9.4%	18.8%
Industry assets in small banks (percent of total)	13.9%	7.0%
Total loans and leases (Trillions of 1994 dollars)	1.50	2.36
Loans made to consumers (percent of total)	19.9%	20.6%
Total number of employees	1,396,970	1,489,171
Number of automated teller machines	13,800	109,080
Real cost (1994 dollars) of processing a paper check	0.0199	0.0253
Real cost (1994 dollars) of an electronic deposit	0.0910	0.0138

As can be seen from this table, the retail banking industry continues to consolidate and to invest heavily in new information technology. As a result, new electronic means of transacting with the bank continue to develop due to their relative cost advantage with the paper-based banking system.

The major force for these changes will be described in detail in the next section, but a quick glance at Figure 1 confirms that increased competition from other players in the financial services industry continues to erode the market-share of banks. This competition, along with the explosive changes in information technology, fuels the need for banks to innovate in products, services, and delivery channels.



**Figure 1. Share of U.S. Consumer Financial Assets 1980-1995<sup>4</sup>**

Given the increasing competition in the retail banking industry and rapid technological evolution, how do banks innovate to meet these challenges? This paper will attempt to answer this question through the consideration of general trends in the industry and through the description of a detailed field study at a major U.S. bank. The next section will discuss the forces that are driving this need to innovate; the means by which banks innovate will be the topic of the third section. Having described the basic forces and the means of innovation, the paper turns to a discussion of what makes for efficient and effective innovation in banking. That is, not all innovation is necessarily good, and even if the innovation is a good idea, its execution can cost substantially more than its benefits! Finally, the implications of these findings on the broader study of innovation in services will be discussed.

## 2. The Forces of Change in Retail Banking

As described above, the retail banking industry is undergoing a period of rapid change in market share, competition, technology, and the demands of the consumer. This section describes the various forces that are driving this change in the industry.

### **Regulatory Change and Consolidation**

As shown in Table 1, the retail banking industry is undergoing a period of rapid consolidation as well as expansion into non-traditional banking products and services. Between 1979 and 1994, approximately 5,000 banking organizations were taken over by other depository institutions. Why?

First, regulations restricting interstate banking and the broadening of product lines of the banks continue to weaken. Changes regarding reserve limits, bank powers, geographic restrictions, and the Glass-Steagall Act restrictions on product offerings have all fueled merger activity.<sup>5</sup> Consider the drive toward national banking, wherein limits on interstate banking activities are removed. As shown in Table 2, banks are responding quickly to the deregulation of interstate limits.

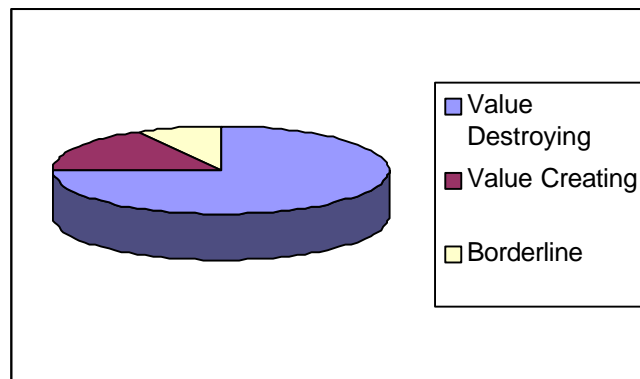
**Table 2. Changes in the Geographic Focus of the U.S. Banking Industry 1979-1994<sup>6</sup>**

Item	1979	1989	1994
Total national banking assets (%) legally accessible from a typical U.S. state	6.5%	29.0%	69.4%
Typical state's banking assets controlled by out-of-state multi-bank holding companies	2.1%	18.9%	27.9%

Similarly, the relaxation of the Glass-Steagall restrictions on bank holding companies have permitted banks to merge across product lines. Bank holding companies are increasingly purchasing mutual fund companies, brokerage houses, and insurance firms in order to offer a full spectrum of financial products to their customers. These cross-industry acquisitions are aimed at stemming the continued erosion of market share depicted in Figure 1. The driving force in every bank is “share of wallet”; the desire to attract and retain more and more of a consumer’s financial

business.

Do these mergers work? At present, the evidence is quite mixed in terms of both cost reduction and profit efficiency.<sup>7</sup> In terms of shareholder value, recent research suggests that the evidence must fall to the camp that argues that these mergers have tended to destroy, not enhance value, as shown in Figure 2.



**Figure 2. Shareholder Value Analysis of Bank Mergers and Acquisitions 1983-88<sup>8</sup>**

One major explanation for this industry's consolidation is the desire to have sufficient size to exploit scale economies in transaction processing, and scope economies in cross-selling multiple financial products to a household. However, numerous studies of efficiency in the banking industry show that neither scale nor scope efficiency is the main cause of inefficiency. Summarizing this research, Berger, Hunter and Timme (1993) state:

The one result upon which there is virtual consensus is that X-efficiency<sup>9</sup> differences across banks are relatively large and dominate scale and scope efficiencies.

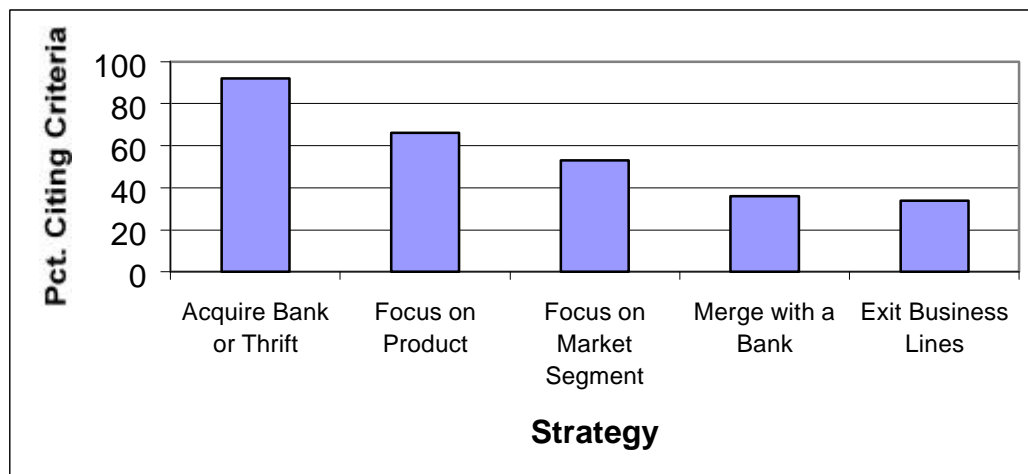
Other results, such as those reported by Fried, Lovell and Vanden Eeckaut (1993) in the context of credit unions, add additional weight to the importance of X-efficiency by providing evidence that it is a dominant factor in both large and small institutions.

Based on this evidence, it is clear that scale and scope economies are not the driving factor in explaining firm-level efficiency and the driving force behind mergers. Summarizing the problems of inefficiency in this industry, Berger, Hancock and Humphrey (1993) state:

Our results suggest that inefficiencies in U.S. banking are quite large - the industry appears to lose about half of its potential variable profits to inefficiency. Not surprisingly, technical inefficiencies dominate allocative inefficiencies, suggesting that banks are not particularly poor at choosing input and output plans, but rather are poor at carrying out these plans.



What then drives the consolidation of the industry? When questioned on their strategic response to increased competition, bank directors stated that acquisitions were the most important method to overcoming competitive threats and positioning themselves for the future (see Figure 3). Thus, much of the consolidation can be viewed as a strategic response to an acceleration of change in the industry. As many bankers will state, they are secretly and some publicly worried about firms like Microsoft entering the banking business. To face this competition, they feel that they must extend both scale and scope in order to compete in the future.



**Figure 3. Bank Director's Response to the Following Question:**

*What will you most likely do to overcome competitive threats and better position yourself for the future?<sup>10</sup>*

Obviously, not all banks that merge or acquire other institutions are achieving negative results. Just like the inefficiencies described above, there is a distribution of talent when it comes to consolidation. In a recent paper, Singh and Zollo (1997) discuss the role of organizational experience and learning in the bank acquisition process. Summarizing their results, the authors state: "The probability of a high level of integration [of banks] is strongly determined by the degree to which the acquirer has codified its understanding of how to accomplish this extremely complex and relatively infrequent task." Thus, the acquisition process itself can be viewed as a major source of innovation in banking.

Mergers and acquisitions, therefore, are a powerful force of change in the banking industry, impacting not only the geographic scope and product variety of the organization, but also affecting the underlying technological and managerial infrastructures of the banks. For the

foreseeable future, consolidation will continue, in order to position the organizations against present and future players in the marketplace.

### ***Technological Innovation***

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Technology plays a key role in the performance of banks. Large banks in the United States spend approximately 20% of non-interest expense on information technology, and this investment shows no signs of abating. Even with these large investments, it is still difficult to ascertain the payoffs associated with these projects. In manufacturing, recent studies (Brynjolfsson and Hitt 1993; Lichtenberg 1995) have found large payoffs in information technology (IT) investments, both in terms of equipment and personnel. For example, Lichtenberg (1995) states that "...the estimated marginal rate of substitution between IS and non-IS employees, evaluated at the sample mean, is 6: one IS employee can substitute for six non-IS employees without affecting output."

Unfortunately, similar results for financial services are not available. For example, in the recent study by the National Research Council (1994; p.81) on IT in services, the problem in the context of banking is summarized as follows:

Neither approach [for productivity measurement] is able to account for improvements in the quality of service offered to customers or for the availability of a much wider array of banking services. For example, the speed with which the processing of a loan application is completed is an indicator of service that is important to the applicant, as is the 24-hour availability through automated teller machines (ATMs) of many deposit and withdrawal services previously accessible only during bank hours. Neither of these services is captured as higher banking output at the macroeconomic level.

While hard and fast data are not yet available, many believe that financial services are at the brink of major performance improvements due to technology. However, this will not come in the traditional back-office functions. Rather, the performance improvements will arise in the integration of front- and back-office functions; i.e., in integrating business processes. Roach (1993; p. 10) points out that the consolidation of back-office operations is due in large part to scale economies due to IT investments, but that these investments are becoming increasingly difficult to find. However, he states that "...new productivity opportunities are now spreading rapidly across the sales function of the service sector..." It is precisely in these front-office functions that major investments will occur. Philip Kotler (as cited in Pine 1993; pp. 43-44)

states this trend clearly:

Instead of viewing the bank as an assembly line provider of standardized services, the bank can be viewed as a job shop with flexible production capabilities. At the heart of the bank would be a comprehensive customer database and a product profit database. The bank would be able to identify all the services used by any customer, the profit (or loss) on these services and the potentially profitable services which may be proposed to that customer...This movement away from mass marketing, mass production, and mass distribution is widespread throughout the financial services industry.

Technological innovation in the retail banking industry has been spurred on by the forces described by Kotler, particularly in terms of new distribution channel systems, such as PC banking. As the industry has provided more ways for consumers to access their accounts, they have added significant costs to each institution. A need to combat these costs resulted in a major cost savings period, where many banks successfully got much of the cost out of the back office. These cost savings came largely through back office automation, which is a technological innovation that has recently been completed. Now, after adding significant costs through added distribution channels and cutting as much as possible in the back office, banks have realized that the key to profitability is through revenue enhancement.

Banks are now forced to consider new ways to drive revenue through their distribution system. The most common way to classify this is through the drive to increase the customer share of wallet. The share of wallet is the portion of a customer's entire financial relationship that any particular bank has with the customer. The prevailing hypothesis is that the more products that a customer has with the bank, the cheaper it is to serve them per product, and the more difficult it would be for the customer to switch to another bank.

The primary revenue-enhancing innovations occurring today are in platform automation for branch and phone center employees, and in the newest distribution channel, PC banking. While these innovations have aspects in common, they each serve different needs in the distribution strategy of retail banks.

Platform automation is the retail banking industry's first major attempt at giving employees a single view of the customer. Prior to this innovation, it was not possible for an employee to view the entire customer relationship at one time. Why is this important? First, a single view lets the employees understand how important a customer is based on their portfolio of products, rather than on their current checking account balance. If hidden behind that low

checking balance is a series of CDs and a home equity loan, for example, then the employee may want to think twice before refusing to waive a small fee associated with the checking account. However, although the concept of bringing all of a customer's relationships with the bank is quite simple, in reality it has proven to be an extremely difficult task.

Retail banks collect and process information by product and transaction, not by customer. Thus, while it is quite easy to access all of the information on checking account customers or on credit card customers, taking a slice of the data, per customer, is technologically difficult. Virtually every bank has been faced with this same problem. Legacy systems were built with transaction processing, per product, in mind. Now, with the need to understand relationships, bringing this data together from a variety of systems and geographies (it is quite common to have credit card processing in another state from the rest of the retail bank, for example) is a massive undertaking.

While PC banking represents a new distribution channel, it also represents an area for significant technological innovation. With this new channel, there are many alternatives available to each bank, and with these alternatives come managerial decisions regarding alliances, outsourcing, new product development and a host of other critical factors that will influence future profitability. At the surface, one could consider the PC channel similar to the phone center, in that a customer is simply contacting the bank remotely, in one case over the phone, in the other by the PC. The major difference between the channels comes in the variety of ways that a bank can offer PC banking and in the implications resulting in each model. We describe the four most common PC banking models in Section 3 in order to demonstrate the variety of alliances and outsourcing practices as well as to discuss the implications of each in terms of potential loyalty and increased share of wallet.

Coincident with the retail banking industry moving from cost-savings innovation to revenue-enhancing innovation is the move from in-house development to outsourcing and alliances. While there are many arguments favoring this shift, including the most common view that banks are not software companies and thus, should not be developing these systems in house, it remains to be seen if this shift will loosen the bank's strong-hold as the predominant financial intermediary. As payment systems in the United States catch up to the rest of the world in terms of the ability to have end-to-end electronic processing, it is not clear where the profits will be

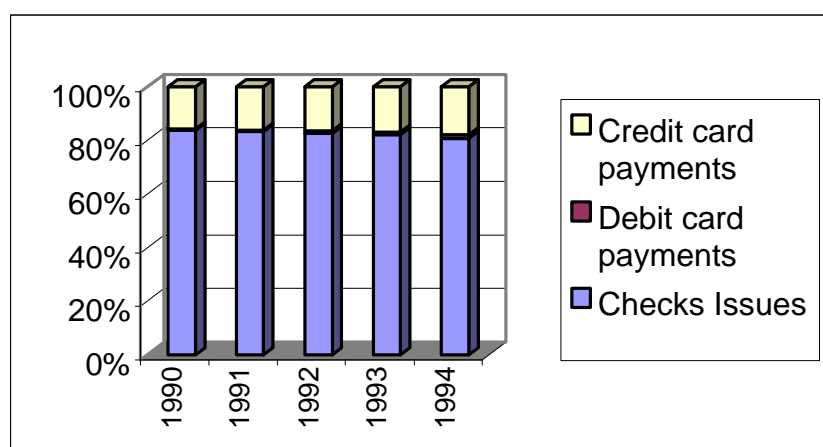
made. Certainly, by making choices today in terms of platform automation and PC banking models, banks are making explicit choices about where they see themselves in the future.

### ***The Changing Consumer***

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The final, and perhaps the most important, force of change in the banking industry is the rapid evolution of consumer wants and desires. Consumers are demanding anytime-anywhere delivery of financial services along with an increased variety in deposit and investment products.

Consider first the desire for greater product diversity. Whereas Fidelity Investment and Merrill Lynch each offer over 100 different choices for mutual funds, the typical bank offers 17.<sup>11</sup> As a result, banks continue to lose market share (Figure 1). Choice of demand deposit accounts with a desired fee structure, the advent of new investment vehicles such as index funds, etc. all fuel the banking customer's desire for new and better financial products.

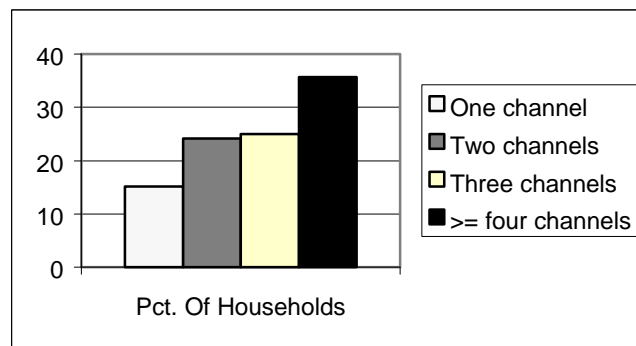


**Figure 4. Use of Various Payment Instruments (millions of transactions)<sup>12</sup>**

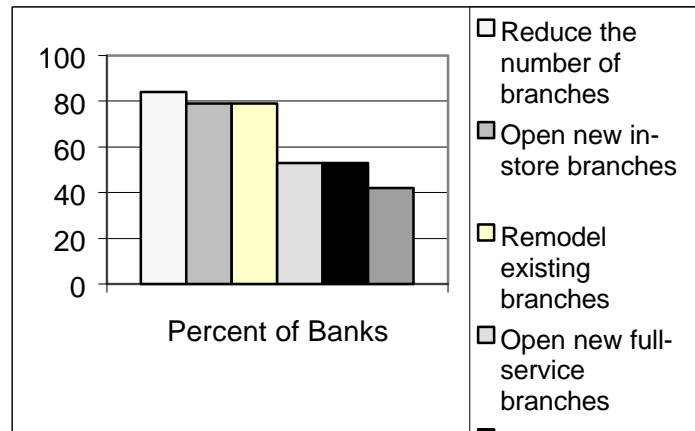
In addition, consumers are moving away from the use of checks to other financial products, albeit slowly (Figure 4). Consumers are also demanding variety of delivery channels available for their use; see Table 3. It is interesting to note that, despite the “hype” that branch delivery is dead, most consumers still frequent the branch. In fact, there has been a rise in the number of branches, including supermarket-based locations (called “in-store branches”) and kiosk-like branches found in many shopping malls. And, as can be seen in Figure 5, this trend to open new physical sites seems likely to continue. Furthermore, it is the “mixed channel consumer”, those that frequent multiple delivery points, that is the norm in the industry (Figure 6).

**Table 3. Percent of U.S. Households Using Various Delivery Channels<sup>13</sup>**

Delivery Channel	% of Households
In person/ branch visit	86.7
Mail	57.4
Phone	26.0
Electronic transfer	17.6
ATM	34.4
Debit card	19.6
Direct deposit	59.6
Pre-authorized debit/ payment	23.6
PC banking	3.7

**Figure 5. Percentage of U.S. Households Using Various Number of Delivery Channels<sup>14</sup>**

Consumers are demanding and receiving a larger variety of traditional and new banking products and delivery systems. The question, however, is how banks capture the value generated by this increase in variety. At present, one only need to look at the controversy surrounding ATM fees to understand that this increase in variety may be detrimental to a bank's profitability. Over decades, banks have invested heavily in ATM machines due to their cost advantage on a per-transaction basis (see Table 4). As one can see, the traditional teller transaction is almost an order of magnitude more expensive than ATM and automated phone systems. This has led banks to attempt to change consumer behavior through the additional of fees (the "stick") and a variety of rebates (the "carrot"). However, despite these efforts, the total cost of serving certain customer segments has not changed significantly due to their resulting change in transaction behavior (think of the typical college student's use of ATM's: one \$20 per day!). It is this change in behavior that will most likely yield the greatest benefit to the banks in terms of cost reduction. However, this change in behavior will be difficult to accomplish, as evidenced by the recent uproar in the U.S. on the increases in ATM fees.



**Figure 6. Branch Activities Planned Over the Period 1995-98<sup>15</sup>**

**Table 4. Comparison of Cost Per Transaction for Various Delivery Channels<sup>16</sup>**

Distribution Channel	Cost Per Transaction
Teller	\$1.40
Telephone (human operator)	\$1.00
Telephone (automated voice response unit)	\$0.15
ATM	\$0.40

Thus, banks must continue to innovate in order to meet the changing needs and desires of the consumer, while at the same time developing new fee structures to migrate consumers away from high-cost delivery systems. This blend of innovation and behavior change lies at the heart of the modern banking organization.

### ***The Resultant Force***

Simply put, these forces impel banks to leverage the developments in information technology to create new products and services for the consumer. This opportunity drives banks to invest in innovative delivery systems, despite the need/ desire to change the behavior of the consumers. We now turn to the innovation mechanisms banks use to meet these challenges.

### 3. How Do Banks Innovate

Given these forces of change, how does a bank innovate? To begin to develop an answer to this question, consider the following two developments in banking: the emergence of the PC/electronic delivery of financial services and the creation of new distribution channel designs.

#### ***Product Innovation: PC Banking***

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Pushed by growing consumer demand and the fear of losing market share, banks are investing heavily in PC banking technology (Frei and Kalakota, 1997). Collaborating with hardware, software, telecommunications and other companies, banks are introducing new ways for consumers to access their account balances, transfer funds, pay bills, and buy goods and services without using cash, mailing a check, or leaving home. The four major approaches to home banking (in historical order) are:

*Proprietary Bank Dial-up Services* - A home banking service, in combination with a PC and modem, lets the bank become an electronic gateway to customer's accounts enabling them to transfer funds or pay bills directly to creditors' accounts.

*Off-the-Shelf Home Finance Software* - This category is an essential player in cementing relationships between current customers and helping banks gain new customers. Examples include Intuit's Quicken, Microsoft's Money, and Bank of America's MECA software. This software market is also attracting interest from banks as it has steady revenue streams by way of upgrades, updates, and the sale of related products and services.

*Online Services-based* - This category allows banks to setup up retail branches on subscriber-based online services (e.g., Prodigy, CompuServe, and America Online).

*World Wide Web-based* - This category allows banks to bypass subscriber-based online services and reach the customer's browser directly through the World Wide Web. The advantage of this model is the flexibility at the back-end to adapt to new online transaction processing models facilitated by electronic commerce and by eliminating the constricting intermediary (or online service).

In contrast to packaged software that offers a limited set of services, the online and WWW approaches offer further opportunities. As consumers buy more and more in cyberspace



using credit cards, debit cards, and newer financial instruments such as electronic cash or electronic checks, they would need software products to manage these electronic transactions and reconcile them with other off-line transactions. In the future, an increasing number of paper-based, manual financial tasks may be performed electronically on machines such as PCs, hand-held digital computing devices, interactive televisions and interactive telephones, and the banking software must have the capability to facilitate these tasks.

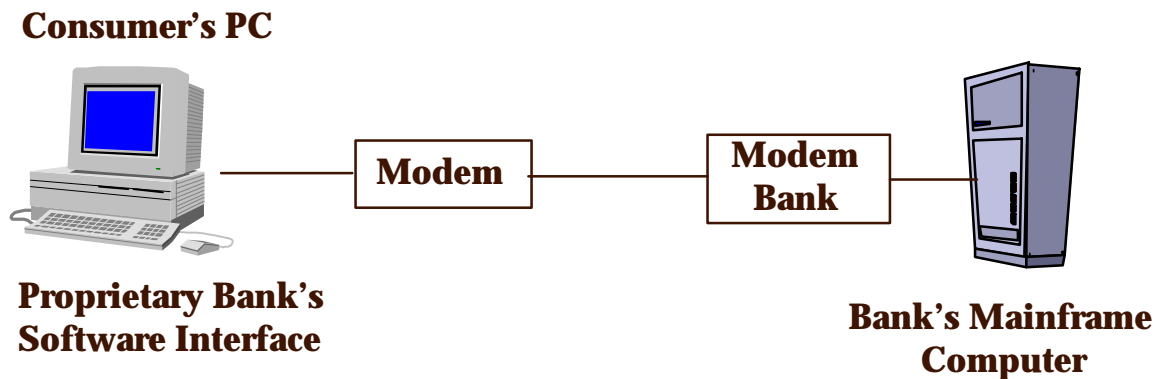
### *Home Banking Using Bank's Proprietary Software*

Online banking was first introduced in the early 1980s when at least four major banks (Citibank, Chase Manhattan, Chemical, and Manufacturers Hanover) offered home banking services. Chemical introduced its Pronto home-banking services for individuals and Pronto Business Banker for small businesses in 1983. Its individual customers paid \$12 a month for the dial-up service, which allowed them to maintain electronic checkbook registers and personal budgets, see account balances and activity (including cleared checks), transfer funds among checking and savings accounts, and—best of all—make electronic payments to some 17,000 merchants. In addition to home banking, users could obtain stock quotations for an additional per-minute charge. Two years later, Chemical teamed up with AT&T in a joint venture called Covidea meant to push the product through the second half of the decade. Despite the muscle of the two home-banking partners, Pronto failed to attract enough customers to break even and was abandoned in 1989.

Other banks had similar problems. Citicorp had a difficult time selling its personal computer-based home-banking system dubbed Direct Access. Chase Manhattan had a PC banking service called Spectrum. Spectrum offered two tiers of service—one costing \$10 a month for private customers and another costing \$50 a month for business users, plus dial-up charges in each case. According to their brochure, business users paid more because they received additional facilities such as the ability to make money transfers and higher levels of security.

Banc One had two products: Channel 2000 and Applause. Channel 2000 was a trial personal computer-based home-banking system available to about 200 customers that was well received. Applause, a personal computer-based home-banking system modeled after Channel

2000, attracted fewer than 1,000 subscribers. The trial was abandoned before the end of the decade, as the service could not attract the critical mass of about 5,000 users that would let the bank break even. In each of the above instances, the banks discovered that it would be very difficult to attract enough customers to make a home banking system pay for itself (in other words, to achieve economies of scale). Figure 7 describes a traditional proprietary system of banking.



**Figure 7. Proprietary Software Method for PC Banking**

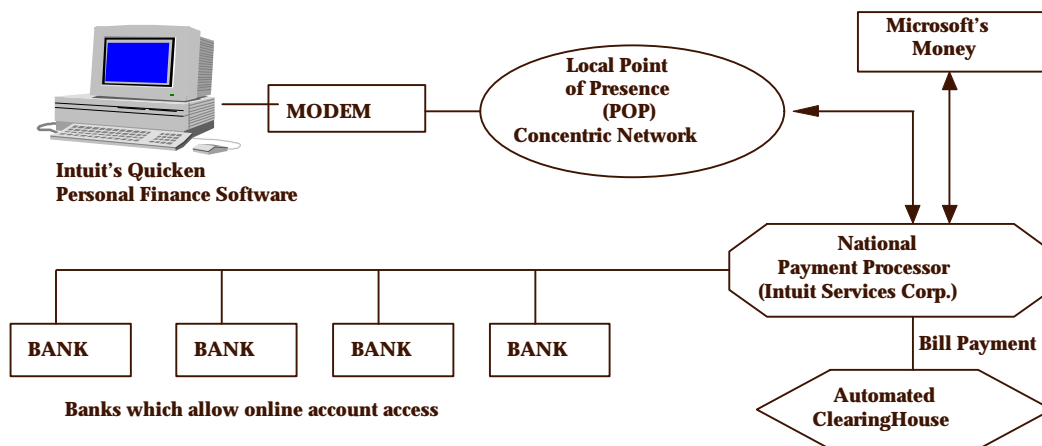
Online banking has been plagued by poor implementations from the early 1980s. Home banking services lost too much from concept to reality. Many systems had gradual evolution, which often meant that consumers who initially used the service and left dissatisfied, could not be coaxed back into using it again.

Recently Citibank has revamped its Direct Access product allowing consumers to dial in to Citibank's system and transact bill-payment services. This new service is promising in that the can check their account balances, transfer money between accounts, pay bills electronically, review their Citibank credit card account, and buy and sell stock through Citicorp Investment Services. Although the underlying systems run in batch-mode, Citibank has put together a middle-ware piece which makes the consumer think that they are operating in a real-time environment. While this can work in a setting where Citibank is not interacting with third-party systems, there are potential difficulties with this batch/real-time mix if Citibank offers outside products and services (e.g. insurance products). In addition, because the consumer is interacting directly with Citibank's system, they have no way of performing household budgeting functions on their financial data. Clearly, Citibank will need to either provide this functionality themselves

or provide easy interface to the popular personal finance packages. However, it is important to point out that the new Direct Access represents the first major improvement in proprietary software home banking in 15 years, which is demonstrated by their explosive growth from 40,000 subscribers to 190,000 in 1996.

### *Banking via the PC Using Dial-Up Software*

The main companies that are working to develop home banking software are Intuit, the maker of Quicken, Microsoft, the maker of Microsoft Money, Bank of America and NationsBank, who acquired Meca's Managing Your Money software from H&R Block, and ADP, which acquired Peachtree Software. Banking with third-party software means that there is an intermediary between the bank and the consumer. In fact, as can be seen by Figure 8, it is easy to imagine how the banks can become back-end commodities in this system, with the third party controlling the customer interface.



**Figure 8. Banking With Dial-Up Software**

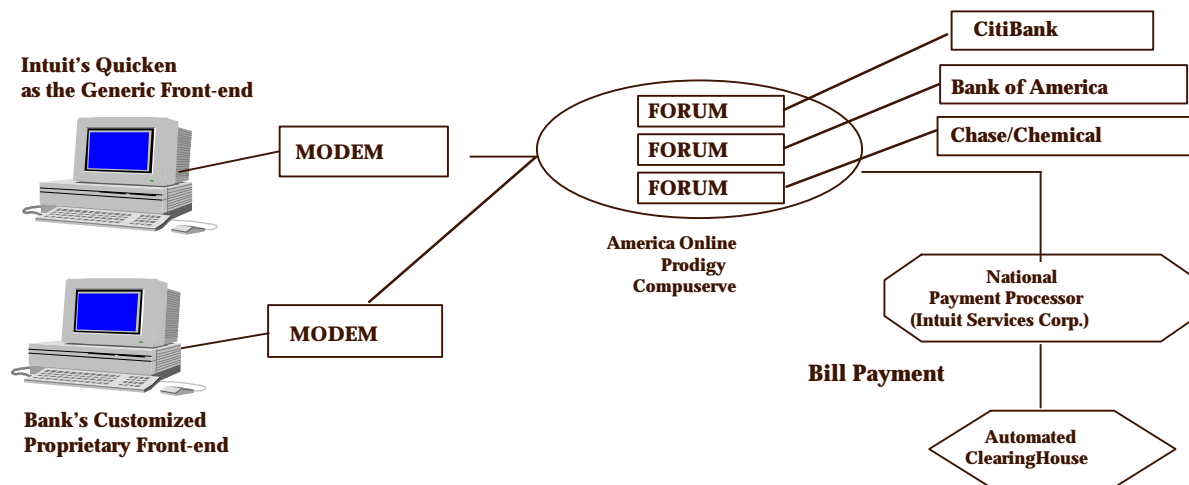
### *Banking Via Online Services*

Although personal finance software allows people to manage their money, it only represents half of the equation. No matter which software package is used to manage accounts, information is managed twice—once by the consumer and once by the bank. If the consumer uses personal finance software, then both the consumer and the bank are responsible for maintaining systems that do not communicate. For example, a consumer enters data once into their system and transfers this information to paper in the form of a check, only to have the bank then transfer

it from paper back into electronic form. In the instance where an electronic check is issued, the systems that receive the information rarely communicate automatically with bookkeeping systems.

Unfortunately, off-the-shelf personal finance software can not bridge the communications gap or reduce the duplication of effort described above. However, a few “home banking” systems that can help are beginning to take hold. In combination with a PC and modem, these home banking services let the bank become an electronic gateway, reducing the monthly paper chase of bills and checks.

The general structure of the online services banking architecture is shown in Figure 9.



**Figure 9. Online Services Banking Architecture**

### *How to Innovate with PC Banking?*

While there is no clear choice as to the appropriate home banking model, it is quite clear that very explicit trade-offs must be made. In addition to considering control of the interface, security, speed of access, and convenience, banks must consider the level of customer support required for each model. Basically, the larger the numbers of intermediaries, the higher the level of support the customer will need. Those banks that understand the technology, human resource, and process issues will have a better chance of coming out ahead in this innovation.

Thus, the fundamental challenges to innovation in PC banking are not technological per se, but rather, arise from the complex set of organizational choices to implement such a service for the consumer. Suppliers can provide not only the software needed to support a PC banking operation, but also the “back office” fulfillment processes as well. The basic innovation for the

bank lies in its integration of these software and fulfillment processes to create the electronic banking service.

To illustrate the fact that it is often organizational change that fuels innovation in banking, we now turn to an example of a bank that is in the process of re-creation.

### ***Organizational Innovation: Re-Creating a Bank***

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National Bank<sup>17</sup>, one of the larger American commercial banks, with branches in many states, has a retail banking arm that is in many respects typical of the industry. Our research team has spent the past year studying the process of innovation at National, tracking the implementation of a major redesign of the retail delivery system.

National, confronted by an increasingly competitive environment, was challenged with improving the cost-efficiency of its far-flung retail delivery system, comprising hundreds of branches, while simultaneously transforming these branches and other channels into retail stores focused more directly on the sale of financial products and services. Our account of the continuing process of redesign at National illustrates a number of the points raised earlier in the paper.

National's retail banking organization was quite decentralized. No single function in the bank had responsibility for retail operations; rather, each of the major geographic areas served by the bank had its own management team. The challenge of redesigning the bank was heightened by the diversity across geographic areas. Some of the state-based operating divisions, and many of the branches, had been acquired from other banks and quickly folded into National, retaining many of their former employees and some of their technology and business processes. In order to drive the redesign, therefore, National had to build from scratch a group responsible for its implementation. The Bank assembled a re-engineering team of over fifty employees, drawn from a diverse set of geographic areas and functional backgrounds, and charged this team with spearheading the overhaul of the branch delivery system.

The redesign at National was initially focused around very basic business process re-engineering in the branches. Over a period of decades, a huge number of administrative functions had accumulated in the branch systems, so that branch managers and service representatives spent a considerable amount of time on these activities rather than in contact with customers. Further,

most of the time spent with customers was centered on simple, transaction-oriented and basic servicing of accounts rather than on activities that were thought to be likely to lead to sales opportunities. Leaders at National, recognizing these problems, engaged a leading consulting firm as a partner in the re-engineering of the branch system, and the consulting firm spent several months working with the implementation team to identify opportunities to streamline branch activities. The outcome of this partnership became known as the “pilot” redesign, and it was agreed that the redesign should be tested in a few small market areas before being rolled out across the bank more broadly.

From the start, by both the consultants and the team conceived the redesign to require broad, systematic change. Effective innovation therefore required the participation of virtually all of the functional areas within the bank, from information systems to marketing to human resources, with each of these areas represented on the implementation team. Anchoring the redesign was the streamlining of branch processes and the relocation of many of the administrative tasks and routine servicing of accounts to central locations outside of the branch. To take one simple example, incoming telephone calls from customers were to be re-routed so that phones in the branch did not ring; rather, customers calling National and dialing the same number they always had used to contact the branch, would now find their calls routed to a central call center.

The innovation also required redesign of the physical layout of the branches. A goal of the redesign was to encourage more customers to use automatic teller machines and telephones for routine transactions. Customers entering the redesigned branch, therefore, were to be greeted by an ATM, an available telephone, and a bank employee ready to instruct them in the use of these technologies. The customer would be directed toward a teller or a service representative only with customer’s persistence or when such personal attention was clearly necessary: for example, to deposit cash, to access a safe deposit box, or to meet with a sales representative about the purchase of a product or service.

These technological innovations, along with the redirection of customers to alternative delivery channels, were intended to realize efficiencies. As an example of the expected efficiencies, early projections by the consulting firm, which were quickly revealed to be overly optimistic, envisioned a 65% decrease in the number of tellers required in the branch system. Over time, it was hoped that many customers would cease to rely on the branch and its employees

for routine transactions and services. The re-engineering was also expected to transform service employees into sales personnel, by allowing them to concentrate their efforts on activities that had potentially higher added value such as customized transactions and the provision of financial advice coupled with sales efforts.

A clear requirement for effective innovation at National, then, was the participation not simply of the employees but also of the customers in the new service processes. In its design, National elected not to pursue some of the more notorious routes favored by other banks (such as charging fees to see tellers), but to lead customers somewhat more gently, by making customer relations a key feature of the redesigned retail bank. The redesign created a customer relations manager in each branch, and it was to be the responsibility of this employee to ensure that each retail customer that entered the branch was guided to a service employee, or alternatively, a technological interface, in order to receive the appropriate level of service.

The redesign also required a large degree of innovation in two further areas: the information system and the telephone call center. The information system was to enable the relocation and standardization of a large number of routine types of account (address changes, for example). Further, information systems were to be improved to give National employees a fuller picture of each customer's financial position and potential. This more complete picture of the customer's portfolio was thought to enhance sales efforts, enabling service representatives to suggest a fit between customers and services, and to refer the customers to areas in the bank with particular expertise in a product if that should become necessary.

Challenges in the IT area were heightened by existing technological legacies and the requirement that customer service continue to be provided accurately and without interruption – customers are not patient with errors or delayed access to their own money. Over time, a large number of systems, laid one on top of the next, had accumulated in the bank. Further, the redesign had both the advantages and disadvantages of being introduced on the heels of a number of earlier, more piecemeal technological and sales initiatives aimed at the same goals. Both the marketing and IT functions had been continuously seeking to improve National's capabilities in these areas. Support for these initiatives, and their success, had been uneven across the various geographic areas. Marketing and IT had also worked with a number of other outside vendors. It was not immediately obvious whether the more systematic redesign should complement or

substitute for these earlier, more incremental changes in systems, or whether these vendors would, or should, have a role in the redesign. Over time, however, these consultants and vendors came under increasing pressure to coordinate their efforts with those of the implementation team, and those who were unsuccessful in doing so were replaced.

The importance of the telephone call center raised a new set of challenges. National had lagged a number of its competitors in the sophistication of its telephone banking system, yet through the redesign, it hoped to make telephone banking, and, eventually, PC or home-banking, cornerstones of its delivery system. Branch redesign, therefore, also required the construction of new call centers, staffing them as the customers began to be directed toward them, and developing an organizational structure not simply to run the call centers but to manage the relationship between the call centers and the branches. Yet more consultants and vendors were required here. The delineation between the new redesign in the branch system, and the specialized expertise of the vendors working with telecommunications technology was clearer, so that managing these continuing relationships raised fewer immediate problems than in the case of the branch-based vendors. However, and more recently, as implementation has continued, new challenges have emerged. The increasing importance of the telephone centers has increased the pressures on the call centers for accurate and effective service, even as the call centers struggle with much more basic issues around staffing and the physical implementation of the telecommunications systems.

Changes in the physical layout of the branches, in information systems, and in the design of key business processes therefore attracted the attention of the implementation team from the beginning of the innovation process. As planning for the implementation of the pilot redesign proceeded, however, it became increasingly obvious to many on the implementation team that the true anchor for the set of innovations was none of these factors. Most critically, the innovations relied upon significant changes in key jobs in the branch systems, on the human resource practices that supported these jobs, and on employees' reactions to these changes.

In order to reinforce further the idea of standardization across the branch system, and to focus efforts toward sales and efficient delivery of services more clearly, the implementation team recommended that the redesign eliminate the position of local branch manager. In each branch, a customer-relations manager would coordinate customer service efforts, but this person would not



have direct authority over the tellers and platform employees in branches. Rather, branch employees would report to supervisors by area: customer-relations employees, branch-sales specialists, and tellers each would be assigned to remote leaders. On the platform, a variety of specialized customer service and sales positions were to be consolidated into a position that was eventually titled “Financial Specialist.” Local areas were also to be staffed with a few roving Financial Consultants that did not have specific branch assignments. Only the tellers were to remain relatively unscathed by the proposed changes.

With this design, the pilot was implemented in two small local markets. Most of the literally hundreds of administrative and servicing processes were removed from the branch. Telephones no longer rang in the branches. The financial specialists were freed to concentrate on sales activities, and found themselves with time available to pursue sales opportunities prospectively rather than simply reacting to walk-in traffic. Most customers responded to the innovation positively, quickly migrating to the new technologies with few problems. The active roles played by the customer-relations managers, many of whom were former branch managers, helped this migration along.

The pilot implementation also revealed a number of problems in the design. First, employees and customers in a few of the most rural branch locations met the redesigned branch with great skepticism. After a period of wrestling with modifications to the design, and considering the benefits associated with the implementation of a single, standardized form of service delivery, the implementation team agreed to abandon the idea of a single best design. It was acknowledged that the characteristics of rural markets differed fundamentally from urban and suburban locations. Rural customers, and the way they expected banks and their employees to provide service, were not likely to be served effectively by the redesigned branch. A new task force was commissioned to explore this problem, and to come up with a design that gained some of the efficiencies associated with standardization and re-engineering for rural branches while acknowledging the key differences.

A second critical problem was the slow implementation of new technology. Many of the new features of the technology needed to support the new design, simply were not ready or did not work as promised. The implementation team, finding it necessary to push forward and being uncertain as to when these features would be ready, moved ahead with the new design anyway,

once they were assured that there would be not critical gaps or stoppages in the provision of services. Basic services were satisfactory. The remaining problems related chiefly to ease of use, performance measurement software, and databases and other systems that were intended to provide more support for sales.

Third, while most customers migrated quickly, and the new processes that were accompanied by supportive technology worked effectively, turning the retail bank branch into a sales-focused financial store proved more difficult. Financial specialists found it difficult to move from the idea of reacting to the sales opportunities that routine servicing occasionally provided, to the more pro-active role that the redesign called for. Some even claimed that the redesign was responsible for decreased sales as a result of the streamlining. The implementation team wondered in turn how much of this difficulty could be attributed to the design, and how much to skills deficits among the financial specialists.

A fourth problem was the difficulty in implementation of human resource practices necessary to support the new organization. The skills deficits raised further issues. For example, training was critical to the success of the implementation, yet the organization had little time to spend in development of the skills critical to the success of the pilot. Further, it had been clear that the selection process for new employees would have to be adjusted to seek employees who were more likely to be effective sales agents, but the initial difficulties with the design made this even more imperative. And while incentive compensation systems were also changed to reflect the new goals of the redesign, these were experimental and required considerable fine-tuning. Perhaps most important, however, was that the new jobs had effectively destroyed career ladders in the pilot branches. No longer could tellers easily move to platform positions; these positions were now expected to require an entirely different skill set, and, typically, a college degree for new applicants. The financial specialists, who typically had been platform employees, could no longer expect to be promoted to branch management positions: these had been abolished and many of the branch managers became customer-relations managers. In each functional area, the hierarchy was flattened. While this yielded efficiency gains, it left employees quite uncertain about their future in the organization.

The implementation team spent much of its time with the nuts and bolts of the new design. Technological and process related problems with implementation, and the challenges associated

with performance measurement, consumed the attention of the team. However, the human resource problems raised serious concerns for the longer-range success of the redesign. Employee confusion and skepticism over the new design was emerging as an impediment to the success of the innovation, and this was, as the implementation team knew, in an environment designed to soft-pedal such concerns. Because the team was concerned about the effectiveness of the technological, process, and architectural changes, they had decided that in the pilot branches the redesign would not be accompanied by any layoffs. They also knew that to achieve the eventual efficiencies they expected, some downsizing of the retail bank would be necessary, and they did not expect that natural attrition, even in the relatively high-turnover retail bank, would yield the cuts in jobs that they hoped for. The team realized that in future implementation the insecurity generated by the job changes would be intensified by the layoffs that would accompany these changes.

Despite these problems, the redesign, with some modifications, moved forward. A second pilot redesign was implemented in urban and suburban markets, in a geographic area distinct from the earlier pilot. More attention was paid to training and selection into the new positions; again, outside consultants were relied upon, this time to help identify employees with appropriate skills and to develop those skills. Some of the technological gaps and challenges had been addressed, yet some remained, yielding a new set of complications in the specifics of implementation. And the second pilot revealed a new set of problems. In this local area, the situation in the branches before the change differed considerably from those in the first set of pilots. In particular, these branches had already been sharply focused on sales opportunities, a reflection of the bank's strategy in this geographic area. While disruption of the status quo in the first set of pilots had been considered to be a positive contribution, the benefits of this disruption in the second group, which was already moving toward a sales-focused branch system, were less clear to local managers, who, consequently, were more skeptical about the benefits of redesign and of a standardized model. Local managers consistently argued for local adaptation of the model, claiming that they knew best what sorts of processes, technologies, and job structures were likely to be most effective in their area.

The implementation team, while sympathetic to these claims, generally resisted the pressure to adapt, but recognized a further difficulty. To argue that the redesigned model must be

strictly adhered to, was to admit that no further learning was to occur as a result of the innovation. Thus, they struggled to find ways to differentiate between local learning that truly represented a positive improvement to the design concepts, and local arguments grounded more in resistance to change in established routines, and to discover principles for making these distinctions as the design was to be rolled out over a much wider area.

Currently the team is preparing to implement the new design across the remainder of the retail bank, with substantial modifications as a result of the learning from the pilots, and wrestling with a number of further issues as they continue the process of innovation. Among these challenges include the problems associated with introducing these innovations in local areas that have already witnessed massive change in recent years as a result of the frantic pace of mergers and acquisitions in the industry. Some of the branches that will be the objects of the redesign will have had three parent banks in the past three years; each change has been accompanied by changes in jobs, processes, systems, and supporting human resource practices. Heaping yet more change on to these locations will be especially difficult.

A second challenge facing the implementation team stems from the current decentralized approach to management of the retail bank. While the details of the pilot redesign have not been formally disseminated across the various geographic areas, word that the bank of the future is soon to arrive has traveled widely. Some of the members of the implementation team have returned to management positions in their local areas. And smart local managers have already begun to identify the trends that the implementation team was charged with addressing, and have begun to address these challenges locally with their own changes and strategies. Thus the implementation team will be trying to innovate not in a static or standard set of channels, but in a wide array of varied and dynamic conditions: in short, against moving targets. Already some local managers have expressed explicitly a desire to get ahead of the game by proceeding with implementation of the features of the pilot redesigns they find most attractive. Left unanswered is how and whether the implementation team will be able to implement other features, or how they will reconcile differences in the pre-emptive local redesigns with their own plan.

Appropriately configuring human resource practices to support innovative systems and process changes raises further, significant challenges. On the one hand, it is clear that simply changing job design and pay systems, and coupling these with other technological and system

changes, will be insufficient: attention must also be given to employee selection and promotion systems, training programs, appraisal systems, the use of flexible scheduling, and the bank's overall approach to employee involvement. However, contemplating such sweeping change severely taxes the organization. While piecemeal change in the human resource system is unlikely to yield the results desired, more comprehensive change raises significantly more challenges in implementation. At National, the hope is that investment in the redesign will improve several areas of performance simultaneously: sales effectiveness, productivity, and the quality of customers' relationship with the bank. In practice, this has proven difficult. The early, piloted version of the re-design was effective at serving customers efficiently: the bank streamlined processes and introduced new technological options. However, the effect of the re-design on sales performance and on the overall depth and quality of the customer relationship is not as clearly positive. In fact, some of the streamlining designed to supplement or improve employee-customer interaction may be replacing this interaction; this may mean missed sales opportunities and fewer chances for bank representatives to assess and attempt to meet customers' needs.

Because much of the change is held to be a necessary response to continuing competitive pressures, it is unlikely that the redesign will actually be evaluated in strict cost-benefit terms. Such an evaluation of these innovations – their costs and benefits – will require a longitudinal, sustained, consistent effort by the bank, even as much of the composition of the implementation team begins to rotate to other positions within the bank. It will also be difficult to decouple the effects of the redesign from other major changes in marketing, product offerings, and from the results of continuing merger and acquisition activity.

Should the design prove successful, this itself will raise sequential challenges for National, which must further innovate to deliver on the promises raised by successful change. To the extent that customers are convinced to migrate to alternative, more efficient delivery channels, the Bank must continue to develop its ability to manage those channels effectively. Such channels – particularly telephone and PC- banking – are not only more technology intensive, but also raise new sets of organizational and human resource problems. As the use of such channels grows, and as their functionality increases, questions over appropriate staffing, training, performance measurement, and reporting structures multiply. Innovation, both organizational and technological, may actually have to intensify as a result of the success of prior changes.

### ***Where's R&D? The Process of Innovation in a Bank***

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The two examples given above highlight the complex organizational design issues involved in the innovation processes in retail banking. Simply put, most retail banks do not have something called an R&D group. If they do, these groups play an important, but small role in the overall innovation practices of the organizations. Marketing, business units, IT, and a complex web of IT suppliers and consultants drive the innovation processes in banking.

Consider the case of National Bank, where there was no division devoted to thinking about or implementing innovation, no “research and development” or similar functional structure. Rather, pressure for innovation built incrementally as a result of numerous smaller initiatives: from marketing; from those responsible for managing technological systems; and from line managers. Each area felt competitive pressure and began to develop responses. At National Bank, these responses were eventually, to some extent, collected and channeled through the implementation team although they also maintained some momentum of their own.

At National Bank, translating this pressure to innovate into actual technological and organizational changes was greatly facilitated by the continuing presence of consultants and of suppliers of technology. Indeed one way to understand at least part of the role of consultants in this case is that they were, and continue to be, suppliers of the organizational technology required to leverage the possible gains from innovations in computing and telecommunications systems. While the organization continues to develop its capacity to learn and innovate, it explicitly recognizes that it has considerable distance to travel in order to exercise this capacity more independently.

One further lesson we take from National in the midst of this redesign is that changes in information technology, and in technological capabilities, can spark the desire for system-wide innovation and even shape its particular form. With the enthusiastic promotion of consultants and outside vendors, technology is perceived by retail banks to be a catalyst for change across the organization. Yet even where this technology is over-sold, poorly understood, or fails to deliver on its promises, the process of innovation may take on its own momentum.

In the case of PC banking, such organizational changes are heightened by the presence of external suppliers of technology, consumer assess, and fulfillment services. As banks continue to grapple with the variety of choices for electronic delivery, new organizational forms and entities

are sure to emerge. As an example, the Bank of Montreal recently created a direct bank called *mbanx*<sup>18</sup>, whose purpose is to be a non-branch-based deliverer of financial services that will directly compete with the existing Bank of Montreal delivery and sales organization. Such developments of new organizational systems for non-physical delivery are sure to accelerate in the next decade.

#### 4. What Drives Efficient Innovation?

Given the need for complex organizational structures to produce innovation in the banking industry, what can be said about which banks are efficient at such innovation? To address this issue, Prasad and Harker (1997) consider the overall impact on IT on productivity in the retail-banking industry in the United States. Using a Cobb-Douglas production function, Prasad and Harker (1997) estimate the following equation using a combination of publicly available and proprietary data:

$$Q = e^{\beta_0} C^{\beta_1} K^{\beta_2} S^{\beta_3} L^{\beta_4} \quad (1)$$

where  $Q$  = output of the firm

$C$  = IT Capital Investment

$K$  = Non-IT Capital Investment

$S$  = IT Labor Expenses

$L$  = Non-IT Labor Expenses

and  $\beta_1, \beta_2, \beta_3$ , and  $\beta_4$  are the associated output elasticities.

Using this function, the following hypotheses were tested:

- IT investment makes positive contribution to output (i.e., the gross marginal product is positive)
- IT investment makes positive contribution to output after deductions for depreciation and labor expenses (i.e., the net marginal product is positive)
- IT investment makes zero contribution to profits or stock market value of the firm.

Studies of productivity in the banking industry struggle with the issue of what constitutes the *output* of a bank. The various approaches chosen to evaluate the output of banks may be classified into three broad categories: the assets approach, the user-cost approach, and the value-added approach (Berger and Humphrey, 1992). As a result, various measures of output were tested in Prasad and Harker (1997). Benston, Hanweck and Humphrey (1982) posit that “output should be measured in terms of what banks do that cause operating expenses to be incurred.” Prasad and Harker (1997) look at a wide variety of output measures, both financial and customer



satisfaction (i.e., the first two levels of analysis described in Section 2). The most meaningful results from this analysis arise when Total Loan + Deposits is used as the output of the institution; these results are summarized in Table 5.

**Table 5. Results of the Estimation of Equation 1**  
**Output = (Total Loans + Total Deposits)**

Parameter	Coefficient	Std. Error	t-statistic	t-statistic: Significance	Ratio to Output	Marginal Product
IT Capital	0.00116	0.013	0.089	7%	0.000452	2.56
IT Labor	0.25989	0.031	8.34	100%	0.0006	449.75
Non IT Capital	-0.02071	0.026	-0.79	57%	0.00428	-4.84
Non IT Labor	0.53244	0. 059	8.95	100%	0.01475	36.10

$R^2 = 41\%$  (OLS); 99% (2-Step WLS)

From this table, it can be seen that the elasticities (the coefficients) associated with IT capital and labor are positive. However, the low significance associated with the IT capital coefficient implies that there is a high probability (0.93) that the elasticity of IT capital is zero. Thus, there is not sufficient evidence to support the hypothesis that IT capital produces positive returns in productivity for IT capital. It is interesting to note that the elasticity of non-IT capital is, at best, zero (being not significantly different from zero), implying that IT capital investment is relatively better than investment in non-IT capital. However, since the marginal product of IT labor is \$449.75, it can be concluded that IT labor is associated with a high increase in the output of the bank.

Since the first hypothesis cannot be supported for IT capital, the discussion of the stronger hypotheses, the second in the list, is restricted to the IT labor results. First, it can be seen that the marginal product for IT labor is very high. Since IT labor is a flow variable, then every dollar of IT labor costs a dollar. In view of this, the excess returns from IT labor can be computed to be \$(449.75 - 1), or \$448.75. Thus, this hypothesis cannot be rejected for IT labor. For the last hypothesis, one has

$$\beta_3 - (\text{IT Labor Expenses} / \text{Non-IT Labor Expenses}) * \beta_4 = .2390 > 0.$$

Thus, there is support for the claim that investment in IT labor makes a positive economic contribution.

As far as capital expenses are concerned, it can be seen that the marginal product of non-IT capital is negative. Further, given the standard errors of the estimation, it is asserted that IT

capital is more likely to yield either slightly positive or no benefits, whereas non-IT capital will most probably have a negative effect, decreasing productivity. More formally,

$$\beta_1 - (\text{IT Capital Expenses} / \text{Non-IT Capital Expenses}) * \beta_2 = .00334 > 0.$$

Given the significance associated with the IT capital estimate however, the last hypothesis failed to be rejected .

Thus, these results show no strong evidence of IT capital making a positive contribution to output. This result is significantly different from previous studies in the manufacturing sector (Lichtenberg, 1995; Brynjolfsson and Hitt, 1996), and seems to be more in conformity with those obtained in Parsons *et al.* (1993), the only formal study on IT in banking to date. While Parsons *et al.* report slightly positive contribution to IT investment, this analysis demonstrates zero or slightly negative contributions.

IT labor presents a very different picture than does IT capital. IT labor contributes significantly to output; its marginal product is at least 10 times as much as that of Non-IT labor. Rather than make the simplistic conclusion from this that a single IT person is equivalent to 10 non-IT persons, it is better perhaps to speculate that this may simply reflect the fact that there is significant difference between the types of personnel involved in IT and non-IT functions. It is more interesting to compare the marginal product of IT Capital versus IT Labor. It is striking that while IT labor contributes significantly to productivity increases, IT capital does not. Thus, these results state that while the banks in our study may have over-invested in IT capital, there is significant benefit in hiring and retaining IT labor.

This result and interpretation is consistent with the idea that aligning capital, rather than throwing technology at problems, is what affects efficiency. IT personnel are likely to be much more effective at ensuring that the implementation of technology does what it is meant to do. The general point is that the management of IT has profound effects on efficiency. Banks that are able to manage their IT effectively are likely to be efficient. These results are consistent with our fieldwork experiences. They are also consistent with the fact that today's high demand for IT personnel is unprecedented in U.S. labor history. Figures from the Bureau of Labor Statistics show that while the overall job growth in the U.S. economy was 1.6% between 1987 and 1994, software employment grew in these years at 9.6% every year, and "cranked up to 11.5% in 1995". The prediction is that over the next decade, we will see further growth in software jobs at

6.4% every year (Rebello, 1996).

The problems are actually likely to be subtler than our measures suggest. For example, IT personnel, while evidently valuable, may not be equally valuable. The point was driven home to us in a series of interviews in a major New York Bank. A Senior Vice President there lamented the fact that “The skills mix of the IT staff doesn’t match the current strategy of the bank,” and said that he “didn’t know what to do about it.” At the same bank, the Vice President in charge of IT claimed, “Our current IT training isn’t working. We never spend anywhere near our training budget.” IT labor is very short supply, and issues as basic as re-skilling the workforce cannot be addressed given the lack of sufficient IT labor in banking.

Other researchers have observed this dependence and under-investment in human capital in technologically-intensive environments. To quote Gunn’s (1987) work in manufacturing, “Time and again, the major impediment to [technological] implementation ... is people: their lack of knowledge, their resistance to change, or simply their lack of ability to quickly absorb the vast multitude of new technologies, philosophies, ideas, and practices, that have come about in manufacturing over the last five to ten years”. Another observation about the transitions firms need to make to gain from technology, again in the manufacturing context, comes from Reich (1984): “... the transition also requires a massive change in the skills of American labor, requiring investments in human capital beyond the capital of any individual firm.”

The evidence also suggests that the effects of management of IT are also being felt more broadly. Consider the *inclusive* model for managing branches, discussed in the preceding section. In this model, information technology and process redesign (popularly, *reengineering*) combine to remove from employees as many basic servicing tasks as possible. These tasks -- simple inquiries, transactions, and movement of funds -- can be automated or turned over to customers. Reengineering frees employees to concentrate more effort on activities that have potentially higher added value: customized transactions, and the provision of financial advice coupled with sales efforts. Second, information technology gives to each employee a full picture of each customer’s financial position and potential; this enhances sales efforts, enabling tellers and customer service representatives to suggest a fit between customers and services, and to refer the customers to employee-teammates with particular expertise in a product if that should become necessary. Challenges under the *segmented* model are less acute, yet still present. In this model,

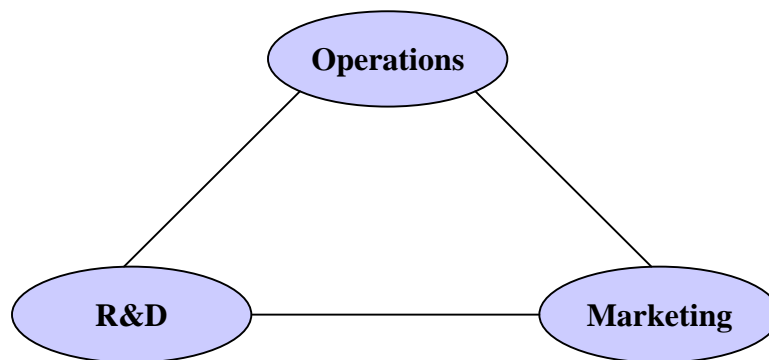
technology is used to simplify the majority of the jobs, to make them easier to learn and, therefore, to make turnover less costly. Only the high value-added, personal banking jobs have access to the broad range of information that might be useful in generating sales leads and opportunities.

In order for either model to function effectively, those responsible for designing IT must understand not only the purposes of the technology, but the capabilities and propensities of the workforce, and the likely effects of different choices in technology on employee and customer behavior. Further, IT staff must be able to assess the likely effects of different configurations of technologies and employment systems if they are to be able to contribute to strategic decisions around the deployment of IT.

Thus, our results are very consistent with Osterman's (1996) conclusion that "... as IT Capital prices fall, production becomes increasingly information-worker intensive." Our results seem to confirm this: banks have over-invested in IT capital, and investment in IT labor has become necessary. Further, IT labor is the most profitable of all four types of investment--IT and non-IT capital and labor available to the bank. That is, the biggest challenge facing banks with respect to efficient and effective innovation lies in the management of the "New Age Industrial Engineers" that must combine technological knowledge with process design in order to create the delivery systems of the future.

## 5. Banking Innovations: Lessons for the Study of Services

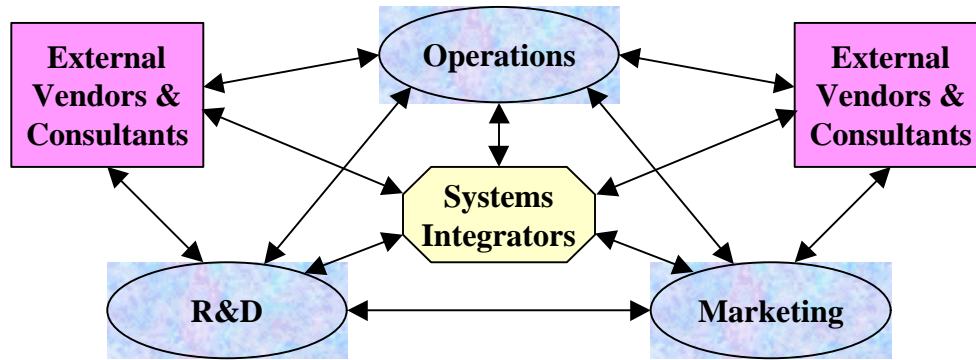
Our study of banking innovation leads us to reconsider the basic model of innovation in the standard textbooks and readings in the field (e.g., the collection of readings in Tushman and Moore 1989). While the basic steps of the innovation process, such as those outlined by Marquis (1969), remain the same, the change arises in the combination of actors that perform these steps. The standard view is that R&D, operations, and marketing combine in a complex web of interactions, to generate innovation (Figure 10).



**Figure 10. Basic Relationship in Innovation Processes<sup>19</sup>**

However, as we have seen from our previous discussion, vendors that supply outsourced services and technology play a vital role in this innovation process.<sup>20</sup> More important is the role of the “systems integrator” in the development of innovations; the person or organization that pulls together not only the operations, IT, and marketing functions for a single innovation, but also manages the portfolio of innovations in the organization. At National Bank, this systems integration role is played by an in-house reengineering team in conjunction with their external consultant (see Figure 11).

Ultimately, it is this systems integration function that will make or break innovation efforts. Jonash (1996) argues that the systems integration function belongs in the hands of the Chief Technology Officer who will coordinate the efforts of internal and external innovation efforts for the benefit of the organization. The results described in the previous section on the critical role of the IT organization in the overall efficiency of the banks tends to support this view.



**Figure 11. Expanded Relationships for Innovation**

The role of the systems integrator is crucial for the future of retail banking. Frei, Harker and Hunter (1997), in summarizing their various analyses of retail banking efficiency based on the dataset described in the Appendix, paints a picture of what makes an effective bank. The good news (or bad news, depending on your perspective), is that there is simply no “silver bullet”, no one set of management practices, capital investments and strategies that lead to success. Rather, it appears that the “Devil” is truly in the details. The alignment of technology, HRM, and capital investments with an appropriate production “technology” appears to be the key to efficiency in this industry. To achieve this alignment, banks need to invest in a cadre of “organizational architects” that are capable of integrating these varied pieces together to form a coherent structure. In fact, several leading financial services firms have realized the need for such talents and are investing heavily in senior managers from outside the industry (most notably, from manufacturing enterprises) to drive this alignment of technology, HRM, and strategy. The challenge, therefore, is not to undertake any one set of practices but rather, to develop senior management talent that is capable of this alignment of practices.

While this alignment may be a problem for those currently in the industry, a longer-term and broader perspective may ask, “So what?” With the increasing deregulation of the financial services industry, those that are capable of successfully aligning business practices will succeed, and others will perish. In the end, the results reported herein have nothing to add to the current policy debates concerning the future of this industry. The problem with this argument is that, with the rapid pace of evolution in the banking industry fueled by deregulation, technological innovation, and changing consumer tastes create a complex dynamic system. The many and varied future scenarios concerning deregulation and technological innovation lead to the inability

to focus on alignment; on which scenario or scenarios should one focus? If one could settle on a given strategy, then, sooner or later, well-managed firms will achieve alignment of strategy, technology, and organizational design. However, the future direction of the industry is subject to a tremendous degree of uncertainty. For example, we collected a variety of strategy-related data as part of this study. As described by Hunter (1996) in the context of human resources, most banks simply could not articulate a consistent and coherent strategy for the future. In numerous visits with the banks that were a part of the study, we would feed back the data they had given to us in order to check its validity. When we would come to the strategy-related questions in the survey, someone in the bank, usually at a senior management level, would state something like “This is wrong; this CAN’T be our strategy!” We would then tell them who provide this data (always another senior manager), and we would become embroiled in a real-time debate over defining the strategy of the bank!

The tension we experienced in the banks over forming a strategy for the future reflects the tension between investing in the perfection of the alignment of labor, capital and production processes for today’s strategy versus the investment in a portfolio of alternative future strategies. This tension is both quite typical and quite real in the banking industry. Given the inability to control the use of the varied distribution channels (ATMs, branches, etc.), banks are either investing in all channels simultaneously or undertaking fairly radical changes to their service offerings in order to deal with this proliferation of services. Thus, bank managers face a crucial decision as to missing the “correct” strategy for the future versus living with misaligned systems that they know to be inefficient.

Given this uncertainty, the removal of inefficient firms may take quite a while to occur. Furthermore, if we are correct in our assessment that a major cause of inefficiency in the industry is the misalignment of management practices, the necessity for integrated financial services organizations to “hedge their bets” on the future may be a major cause of persistent inefficiency in the banking industry. Clearly, alignment would be simpler and occur more rapidly in an industry made up of many “niche” players, each focusing on a likely future scenario. Such movement to dis-integrate financial services are already underway in most banking organization when one considers how business units like credit cards and trust are run as completely separate operations.

The “bottom line” of this analysis is service industries, like banks, must develop a new

generation of management talent to play this role of architect, one who can blend technical knowledge with complex organizational design issues to drive innovation through their firms.



## References

- Akhavein, J.D., A.N. Berger and D.B. Humphrey (1997), "The effects of megamergers on efficiency and prices: evidence from a bank profit function," *Review of Industrial Organization* 12, 95-139.
- American Banker (1997), "Yankee Group Comments," February 10.
- Benston, G.J., G.A. Hanweck, and D.B. Humphrey (1982), "Scale economies in banking: a restructuring and reassessment," *Journal of Money, Credit and Banking* 14, 435-450.
- Berger, A. N., D. Hancock, and D.B. Humphrey (1993), "Bank efficiency derived from the profit function," *Journal of Banking and Finance* 17, 317-348.
- Berger, A. N. and D. B. Humphrey (1992), "Measurement and efficiency issues in commercial banking," in Z. Griliches (ed.), *Output Measurement in the Services Sector: National Bureau of Economic Research Studies in Income and Wealth* (Chicago, IL: University of Chicago Press).
- Berger, A. N., W. C. Hunter, and S.G. Timme (1993), "The efficiency of financial institutions: a review and preview of research past, present and future," *Journal of Banking and Finance* 17, 221-250.
- Berger, A.N., A.K. Kashyap, and J.M. Scalise (1995), "The transformation of the U.S. banking industry: what a long, strange trip it's been," *Brookings Papers on Economic Activity* 2, 55-218.
- Brynjolfsson, E. and L. Hitt (1993), "Is information systems spending productive? New evidence and new results," Working Paper, Coordination Laboratory, MIT (Cambridge, MA).
- Brynjolfsson, E. and L. Hitt (1996), "Paradox lost? Firm-level evidence on the returns to information systems spending," *Management Science* 42, 541-558.
- Cates, D.C. (1991), "Can bank mergers build shareholder value?" *Journal of Bank Accounting and Finance*, 6-7.
- Chesbrough, H.W. and D.J. Teece (1996), "When is virtual virtuous? Organizing for innovation," *Harvard Business Review* 74 (January-February), 65-71.
- Council on Financial Competition (1996), *Letter from the Future: Beyond the Branch-Based Franchise* (The Advisory Board Company, Washington, DC).
- Drew, S.A.W. (1995), "Accelerating innovation in financial services," *Long Range Planning* 28, 11-21.
- Ernst and Young (1996), *Creating the Value Network 1996* (New York, NY).
- Frei, F.X., P.T. Harker, and L.W. Hunter (1997), "Inside the black box: what makes a bank efficient?," Working Paper 97-20, Wharton Financial Institutions Center, The Wharton School, University of Pennsylvania (Philadelphia, PA); also available at <http://wrdsenet.wharton.upenn.edu/fic/wfic/papers.html>
- Frei, F. X. and Kalakota, R. (1997), "Frontiers of Online Financial Services," in M. J. Cronin

- (ed.), *Banking and Finance on the Internet* (New York: Van Nostrand Reinhold Press).
- Fried, H. O., C. A. K. Lovell, and van Eeckaut, P.V. (1993), "Evaluating the performance of U.S. credit unions," *Journal of Banking and Finance* 17, 251-266.
- Galbraith, J.R. (1982), "Designing the innovating organization," *Organizational Dynamics* (Winter), 3-24.
- Griliches, Z. (1992), *Output Measurement in the Services Sector: National Bureau of Economic Research Studies in Income and Wealth* (Chicago, IL: University of Chicago Press).
- Gunn, T. G. (1987), *Manufacturing for Competitive Advantage* (Cambridge, MA: Bollinger).
- Herring, R. J. and A. M. Santomero (1991), "The role of the financial sector in economic performance," *Study Prepared for the Kingdom of Sweden's Productivity Commission*, Stockholm.
- Hitt, L. and E. Brynjolfsson (1996), "Productivity, business profitability, and consumer surplus: three different measures of information technology value," *MIS Quarterly* (June), 121-142.
- Huber, G.P. and D.J. Power (1985), "Retrospective reports of strategic-level managers: guidelines for increasing their accuracy," *Strategic Management Journal* 6, 171-180.
- Hunter, L.W. (1996), "When fit doesn't happen: The limits of business strategy as an explanation for variety in human resource management practices," presented at the Academy of Management Annual Meeting, Cincinnati, Ohio, August 1996.
- Hunter, L.W. and L. Hitt (1997), "Technology, human resources, and productivity in bank branches," Working Paper, Wharton Financial Institutions Center, The Wharton School (Philadelphia, PA).
- Hunter, L.W. (1997), "Transforming retail banking: Inclusion and segmentation in service work," Working Paper, Wharton Financial Institutions Center, The Wharton School (Philadelphia, PA).
- Jonash, R.S. (1996), "Strategic leveraging making outsourcing work for you," *Research-Technology Management* 39, 19-25.
- Kennickell, A.B. and M.L. Kwast (1997), "Who uses electronic banking? Results from the 1995 survey of consumer finances," Working Paper, Division of Research and Statistics, Board of Governors of the Federal Reserve System (Washington, DC).
- Leibenstein, H. (1966), "Allocative efficiency verses 'X-inefficiency,'" *American Economic Review* 56, 392-415.
- Leibenstein, H. (1980), "X-efficiency, intrafirm behavior, and growth", in S. Maital and N. Meltz (eds.), *Lagging Productivity Growth* (Cambridge, MA: Ballinger Publishing), 199-220.
- Lichtenberg, F. R. (1995), "The output contributions of computer equipment and personnel: a firm-level analysis," *Economics of Innovation and New Technology* 3.
- Loveman, G.W (1994), "An assessment of the productivity impact of information technologies,"

- in T.J. Allen and M.S. Scott Morton (eds.), *Information Technology and the Corporation of the 1990s: Research Studies* (Cambridge, MA: MIT Press).
- Marquis, D.G. (1969), "The anatomy of successful innovations," *Innovation* (November).
- National Research Council (1994), *Information Technology in the Service Society* (Washington, DC, National Academy Press).
- Osterman, P. (1986), "The impact of computers on the employment of clerks and managers," *Industrial and Labor Relations Review* 39, 175-86.
- Parsons, D., C.C. Gotlieb, and M. Denny (1993), "Productivity and computers in Canadian banking," in Z. Griliches and J. Mairesse (eds.) *Productivity Issues in Services at the Micro Level* (Boston, MA: Kluwer Academic).
- Peristiani, S. (1997), "Do mergers improve X-efficiency and scale efficiency of U.S. banks? Evidence from the 1980s," *Journal of Money, Credit, and Banking* 29, 326-337.
- Prasad, B. and P.T. Harker (1997), "Examining the contribution of information technology toward productivity and profitability in U.S. retail banking," Working Paper 97-09, Financial Institutions Center, The Wharton School, University of Pennsylvania (Philadelphia, PA); available at <http://wrdsenet.wharton.upenn.edu/fic/wfic/papers.html>
- Pine, B. J. (1993), *Mass Customization: The New Frontier in Business Competition* (Boston, Harvard Business School Press).
- Reich, R.B. (1984), *The Next American Frontier* (New York: Penguin Books).
- Rhoades, S.A. (1993), "Efficiency effects of horizontal (in-market) bank mergers," *Journal of Banking and Finance* 17, 411-422.
- Roach, S.A. (1993), *Making Technology Work* (Economic Research Unit, Morgan Stanley & Co., New York).
- Rubenstein, A.H. (1994), "Trends in technology management revisited," *IEEE Transactions on Engineering Management* 41, 335-341.
- Shaffer, S. (1993), "Can mergers improve bank efficiency?" *Journal of Banking and Finance* 17, 423-436.
- Singh, H. and M. Zollo (1997), "Learning to acquire: knowledge accumulation mechanisms and the evolution of post-acquisition integration strategies," Working Paper 97-10B, Financial Institutions Center, The Wharton School, University of Pennsylvania (Philadelphia, PA); available at <http://wrdsenet.wharton.upenn.edu/fic/wfic/papers.html>.
- Tushman, M.L. and W.L. Moore, eds. (1988), *Readings in the Management of Innovation*, 2<sup>nd</sup> Edition (New York: Harper Business).

## **Appendix: Structure of the Wharton/Sloan Retail Banking Study**

This paper is partially a result of the work undertaken by the retail banking study at the Wharton Financial Institutions Center. The retail banking study is an interdisciplinary research effort aimed at understanding the drivers of competitiveness in the industry, where competitiveness means not simply firm performance but the relationship between industry trends and the experiences of the retail banking labor force. In the exploratory first phase of a study of the United States retail banking industry during Summer 1993 through Fall 1994, a research team conducted open-ended and structured interviews with industry informants, and shared its impressions with these informants at a number of conferences. The broad agenda for the retail banking study entails furthering the understanding of competitiveness in the industry.

The team interviewed top executives, line managers in retail banking, human resource managers, executives responsible for the implementation of information technology, retail bank employees, and industry consultants. The first phase featured site visits to thirteen U.S. retail bank headquarters, and interviews with numerous other managers and employees in remote and off-site locations. The interviews began with very general questions, and the questions increased in specificity as the research progressed. In this phase of the study, the team collected data through the use of two waves of structured questionnaires in seven retail banks. The team's analysis of the data in these questionnaires was then presented to management teams in six of the seven banks, and used as the basis for the second phase, a large-sample survey.

The second phase of the study entailed a detailed survey of technology, work practices, organizational strategy, and performance in 135 U.S. retail banks. The team sought to survey a group of banks that could yield the broadest coverage of trends in human resources, technology, and competitiveness in the industry. The survey focused on the largest banks in the country and was not intended as a random sample of all U.S. banks. In the end, the approach gained the participation of banks holding over 75% of the total assets in the industry in 1994. The process began by compiling a list of the 400 largest bank holding companies (BHCs) in America at the beginning of 1994. Merger activity, and the fact that a number of BHCs had no retail banking organization (defined as an entity that provides financial services to individual consumers), reduced the possible sample to 335 BHCs. Participation in the study was confidential, but not

anonymous, enabling the team to match survey data with data from publicly available sources.

Participation in the study required substantial time and effort on the part of organizations. Therefore, commitment to participation was sought by approaching the 70 largest U.S. BHCs directly, and, in the second half of 1994, the participation of one retail banking entity from each BHC was requested. Fifty-seven BHCs agreed to participate. Of these, seven BHCs engaged the participation of two or more retail banks in the BHC, giving us a total of 64 participating retail banks. Multiple questionnaires were delivered to each organization in this sample. Questionnaires ranged from 10 to 30 pages, and were designed to target the “most informed respondent” (Huber and Power, 1985) in the bank in a number of areas, including business strategy, technology, human resource management and operations, and the design of business processes. The team made a telephone help line available to respondents who were unsure of the meaning of particular questions. Questionnaires to four top managers were delivered: the head of the retail bank, the top finance officer, the top marketing officer, and the top manager responsible for technology and information systems. These banks received questionnaires for one manager of a bank telephone center, and for one branch manager and one customer service representative (CSRs) in the bank's ‘head office’ branch, defined as the branch closest to the bank’s headquarters. In addition, an on-site researcher gathered data about all business process flows in the head-office branch. Identical questionnaires were mailed to five more branch managers; the instructions to the bank were to choose the sample branches so that if possible data was received from two rural, two urban, and two suburban branches. Questionnaires were also mailed to CSRs in those branches. In these questionnaires, the CSRs themselves mapped processes associated with home equity loans, checking accounts, certificates of deposit, mutual fund accounts, and small business loans.

In order to facilitate the creation of process maps via the mailed survey, a worksheet was developed for the CSRs to fill out. These worksheets, a sample of which is shown in Frei (1996), list the majority of potential steps required in the process so that the CSR need only indicate the order of the step, the person responsible for its execution, the type of technology involved, and the amount of time the step takes. Adequate space was provided for the addition of steps unique to an institution.

In late 1994, survey questionnaires were mailed to top executives of the 265 next largest

BHCs, and followed with a telephone call requesting the participation of one of their retail banking organizations. Sixty-four of these BHCs agreed to participate in the study, and four of these engaged the participation of two or more retail banks in the BHC, so that a total of 71 participating retail banks in the mailed survey. For this group of banks, the head of the retail bank was surveyed, and many of the questions directed to the other top managers were consolidated into this survey. Prior interviews had suggested that for banks of this size, the head of retail was able to answer this broader set of questions accurately. For this sample, questionnaires were mailed to one telephone center manager, one branch manager, and one CSR in the head office branch. The telephone help line was also available to respondents in this sample.

All together, the entire survey of retail banking covers 121 BHCs, and 135 banks, which together comprise over 75% of the total industry, as measured by asset size. The scope and scale of this survey make it the most comprehensive survey to date on the retail banking industry.

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<sup>2</sup> Comparison based on average 1991 data reported by the U.S. Bureau of Labor Statistics, *Employment and Earnings Report*, March 1992. Data for the financial services industry includes SIC codes 60-64 and 67. Data for the apparel, automobile, computer, pharmaceutical and steel industries include SIC codes 239 (less 23), 371, 357, 283, 331, and 332.

<sup>3</sup> Data from Tables 1 and 2 in Berger, Kashyap and Scalise (1995). A "megabank" in this table is a bank with over \$100 billion in assets in real 1994 dollars. A "small" bank is one with assets under \$100 million in 1994 real dollars.

<sup>4</sup> Data from Federal Reserve; reproduced in Council on Financial Competition (1996), p. 5.

<sup>5</sup> See Berger, Kashyap and Scalise (1995) for a detailed discussion of these regulatory changes.

<sup>6</sup> Data from Table 3 in Berger, Kashyap and Scalise (1995).

<sup>7</sup> Some studies, such as Shaffer (1993) and Akhavein, Berger, and Humphrey (1997), show that banks can obtain lower costs and increased profits, while others (Rhoades 1993; Peristiani 1997) show little to no post-merger gains.

<sup>8</sup> From D.C. Cates (1991).

<sup>9</sup> X-efficiency (Leibenstein, 1966, 1980) describes all technical and allocative efficiencies of individual firms that are not scale/scope dependent. Thus X-efficiency is a measure of how well management is aligning technology, human resources, and other assets to produce a given level of outputs.

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<sup>10</sup> Towers Perrin survey.

<sup>11</sup> “Mutual Fund Review,” *Wall Street Journal*, April 1996.

<sup>12</sup> From Table 1 in Kennickell and Kwast (1997).

<sup>13</sup> From Table 2 in Kennickell and Kwast (1997).

<sup>14</sup> From Table 2 in Kennickell and Kwast (1997).

<sup>15</sup> From an annual survey of major U.S. banks by Ernst and Young (1996).

<sup>16</sup> From Oliver Wyman and Company.

<sup>17</sup> National Bank is a pseudonym.

<sup>18</sup> For details on mbanx, see the following Web address: <http://www.mbanx.com/>.

<sup>19</sup> Adapted from Galbraith (1982).

<sup>20</sup> For a discussion on the strategic role of firms that supply outsourcing services, see, for example, Jonash (1996), Chesbrough and Teece (1996), and Rubenstein (1994). For the particular case of financial services, see Drew (1995).