

# Deploying Internet Banking and e-Commerce—Case Study of a Private-Sector Bank in India

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## ABSTRACT

Over the last decade India has been one of the fastest adopters of information technology, particularly because of its capability to provide software solutions to organizations around the world. This capability has provided a tremendous impetus to the domestic banking industry in India to deploy the latest in technology, particularly in the Internet banking and e-commerce arenas. This article discusses the experiences of a private-sector bank in deploying Internet banking and e-commerce in India. Strategic alignment of business and IT strategies, planning and implementation of e-banking initiatives, and management of benefits are captured, along with key contributions to development. © 2005 Wiley Periodicals, Inc.

**Keywords:** IT in banking; Indian banks; IT for development

## 1. INTRODUCTION

As the new millennium and information age progress, organizations around the world are going through massive transformation efforts to cope with the constantly changing business environment. Increasing domestic and global competition, economic downturn, rapidly changing market trends, and volatile financial markets have all added to the pressure on organizations to come up with effective responses to survive and succeed. Furthermore, easing of international trade barriers, economic liberalization, globalization, and deregulation have led to several challenges for organizations in developing and newly industrializing economies like India. To effectively respond to the rapid changes in the external environment, several firms have turned to information technology (IT) to improve their productivity and competitiveness. Until the mid-1990s, many Indian organizations had operated under a protected economic regime, limited competition, and a regulated environment. This had resulted in limited focus on process efficiencies, centralized control structures, highly formalized business settings, and lack of professional business practices. However, following

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the economic liberalization and opening up of the economy to foreign competition, Indian organizations have been forced to adopt modern business practices and strategies. In an effort to enhance their competitiveness, several organizations have turned to IT to improve business processes and exploit efficiencies in the value chain. According to Howkins and Valantin (1997), implementation of IT opens the floodgates to a whole set of new policies for development, and allows the developing countries to take on equal footing with OECD (Organization for Economic Co-operation and Development) countries. Further, it is argued that acquiring IT will not automatically translate into development of organizations and economies. Low penetration level of ICT in many developing countries hinders efforts to harness the technologies for development (Akpan, 2003).

The banking industry in India is no different from other industries in terms of facing changing market conditions and leveraging IT for competitive advantage. In the current global context, IT is an imperative for organizations to remain competitive and grow. Although technology adoption by the banking industry in many countries around the world has been at a very high level, the process has been slow in India over the last several years. However, the emergence of new private-sector banks in the country in the midnineties has changed the scenario drastically, as the business model of these new banks revolved around a strong IT backbone. Their emergence and success over the last decade has put competitive pressure on many of the state-owned banks to look at IT as a strategic necessity to remain competitive. However, the extent of the latter's success has not been to the same degree, and there is a need to examine the strategy and implementation of IT in one of the new private-sector banks at length, to understand the contributors to their success, and to present the finding as a learning tool for those who have not been as successful.

Though many interesting articles are found in newspapers and magazines regarding initiatives of several banks in India, detailed accounts in terms of how banks were able to align IT with business are seldom made available to the academia and practitioners. Our research is an attempt to address this gap. The primary objectives underlying the research article is to gain understanding of how Indian banks exploit IT in the globalized and liberalized business environment, especially in the area of on-line banking both in the areas of B-C (business to consumer) and B-B (business to business) e-commerce. The case study shed light on a number of aspects that need careful consideration when one is designing and deploying Internet-based banking in the Indian context. The article is organized as follows: In the next section, we present a note on banking in India and information technology in banking. We also briefly review pertinent literature in the following section. We then present a detailed discussion on on-line banking initiatives at one of the private-sector banks in India in terms of key initiatives, implementation, and primary benefits. Finally we present a set of facts learned and conclusions.

## **2. BANKING IN INDIA**

In the late 1960s the Government of India nationalized all the major commercial banks by transferring the ownership from private ownership to government ownership. A second round of nationalization of banks happened in the late 70s. As a result, during the 70s and 80s the nationalized banks, which were owned by the government, together accounted for 95% of the market share for all banks in the country, the remaining 5% being contributed mainly by banks in the private sector and some multinational banks whose presence was limited to the large cities. This scenario continued until the early 1990s, when the Government of India, as part of its overall financial-sector reforms, decided to

grant banking licenses to start nine new banks in the private sector. The emergence of new private-sector banks, expansion by the foreign banks, the changing business model of the nationalized banks compounded by the financial sector reforms and the burgeoning middle class, have, over the last 10 years, completely transformed the way banks in India operate. The government-owned commercial banks today have a market share of about 75% (down from the earlier 95%), the private-sector banks about 20% and the foreign banks about 5%. These percentages are expected to undergo further and far-reaching changes in the coming years thanks to the intense competition that has been unleashed in the last 5 years. Alongside this phenomenon, some of the world-renowned foreign banks who have historically had a presence in India also started to expand their business in India, particularly in the area of retail banking, where a burgeoning middle class of almost 200 million people offer an enormous business opportunity. Therefore, both businesses and the masses of India have been exposed to a variety of banking services at different levels.

### **3. INFORMATION TECHNOLOGY ADOPTION BY BANKS IN INDIA**

Information technology was primarily employed to automate the back offices of banks in the 1970s. Computers were introduced as “ledger posting machines” as, at that time, many employee unions of government-owned commercial banks opposed any form of automation. Employee unions argued that such a move would lead to unemployment. IT has indeed been deployed in a variety of back-office and customer-interface activities of banking. Even the government-owned commercial banks today are happy to call themselves fully computerized. However, from a technology perspective, banks in India have been confronted by two major challenges in adopting information technology both as a strategic tool and as an operational necessity. The first major challenge was the availability of a comprehensive centralized banking application system that could cope with the various operational requirements and controls that are very specific to the Indian banking environment, by virtue of almost 30 years of strong government control. Most of the internationally recognized centralized banking application systems were built to meet the banking needs and practices particularly of the Western world and the Asia Pacific region. It is appropriate to mention here that some of the world-renowned software companies in India that have come of age in the last decade have built world-class centralized banking application systems in collaboration with banks in India. These solutions not only meet the requirements of Indian banks but are today among the best-selling core banking application systems across the world.

The second major challenge was the difficulty in deploying a robust data communications network that would connect the branches of the bank to the data center hosting the core banking application systems. Thanks to the very rapid and progressive measures taken by the Government of India, the telecommunication infrastructure has grown very rapidly in India and has helped banks, particularly in the last 4 years, to build robust data communication networks spanning over 200 cities and towns across the country. Having deployed a centralized core banking application systems and a robust telecommunications network, a number of banks, over the last 3–5 years, have been leveraging the same to create multiple delivery channels such as Internet banking, automated teller machines (ATMs), call centers, mobile banking, and so on. The new private-sector banks, by virtue of their intrinsic ability to absorb technology faster, have been at the cutting edge of technology deployment among banks in the country. These new alternate delivery channels have helped to keep the growth of brick-and-mortar branches of the banks at a far lower level than in the past.

#### 4. LITERATURE REVIEW

The global business environment witnessed many changes in the last decade of the 20th century, among which is electronic commerce, or exchange of products and services through Internet and telecommunication networks (Kalakota & Whinston, 1997). Most of the industries have been influenced by this emerging technology-based approach to business (Gunasekaran & Love, 1999). Previous literature on IT in developing countries has focused on development of national policies (Bhatnager & Odreda, 1992; Madon, 1992), development of manpower (Aladwadni, 2001; Bhatnager, 1992; Kanungo, Sadavarti, & Srinivas, 2001; Montealegre, 1998; Pawar, 1992), using tested technologies (Galvas, 1989), managing IT investments (Aygerou, 1998; Heeks, 2002; Kraemer & Dedrick, 2001), and role of consultants in deploying technologies (Palvia, Palvia, & Zigli, 1992).

However, the impact of electronic commerce has been apparent in the banking and financial services industry when compared with other industry segments (Bughin, 2004; eMarketer, 2000). From the Asian market experience, it is clear that Internet banking is here to stay and will be a major channel to acquire and service customers. Internet usage and Internet banking is expected to grow to more than 45.4 million by 2006 in the Asia Pacific region (Jaffe, 2003). The percentage of banks that have launched on-line banking products and services has grown from 6% in 1998 to 75% in 2003. According to IDC, markets like Korea and Singapore have nearly 10% of their population banking over the Internet during the same period. Although these markets are way ahead of India both in terms of Internet penetration and on-line banking penetration, India is a big potential market and is fast catching up with its Asian counterparts.

It is evident from the literature that banks across the world are motivated to implement e-banking to achieve either top-line or bottom-line benefits. This is achieved through increased market share due to product delivery convenience and product innovation (Jaleshgari, 1999; Orr, 1999). Further, it is found from the literature that banks in the developed markets with established telecommunications, commercial, and legal infrastructures and possessing the necessary resources and levels of operational efficiency in terms of costs and revenue have a greater chance of successfully implementing e-banking (Goodman, 1999; Messmer, 1999). There are new opportunities for the banks in the form of reintermediation in the e-commerce market by identifying themselves as trust authorities to validate and stand as security between business and consumers (Kalakota & Whinston, 1997). Although the Internet is revolutionizing the way in which companies offer their products and services, studies relating to customer acceptance of this technology are limited (Meuter, Ostrum, Roundtree, & Bitner, 2000). An understanding of different dimensions of creating value to the customer through use of new technology and its impact on their performance in terms of return on investment is always a matter of concern for the banking and financial services industries (Lucas, & Spilter, 1999).

It has been found (Liao & Cheung, 2002) that individual expectations regarding accuracy, security, transactions speed, user-friendliness, user involvement, and convenience were the most important quality attributes in the perceived usefulness of Internet-based e-banking. Trust is also one of the important determinants of successful e-banking (Suh & Han, 2002). Many researchers have argued that trust is essential for understanding interpersonal behavior and is relevant to e-banking. Trust is not merely a short-term issue, but also the most significant long-term barrier for realizing the potentials of BtoC e-commerce (Gefen, 2002; Jarvenpaa, Tractinsky, & Vitale, 2000). Models have been proposed by researchers to measure the impact of e-banking. A model was proposed (Stamoulis, Panagiotis, &

Drakoulis, 2002) for evaluating the business value of e-banking channels involving an internal view, where the channel is considered as a resource whose utilization must be maximized, and an external view, where the channel as an interface to the bank's customer base should enable and support customer relationship management. Previous research also (Courchane, Nickerson, & Sullivan, 2002) reveals that the effectiveness of Internet banking is related to the size of a bank and is projected to have significant impacts on various elements of the banking system, which is faced with many challenges. Some of the critical challenges (Aladwani, 2001) facing planners are (a) the effect of customer- and market-oriented forces on on-line banking strategies, (b) the effect of organizational characteristics on on-line banking strategies, (c) what leads to customer trust in on-line banking, (d) the attributes of on-line banking design contributing to customers' satisfaction, (e) effective measures to secure and audit on-line banking systems and transactions, and (f) appropriate laws supporting on-line banking operations.

## 5. RESEARCH METHODOLOGY

The difference between developed and developing countries in formulating and implementing IT, specifically e-business, is the distinctive dimensions of the business environment. Accordingly, contextual realities within and outside the organizations have a major influence on the overall effectiveness of IT exploitation. Case-study research is the most common qualitative method used in information systems (Alavi & Carlson, 1992; Orlikowski & Baroudi, 1991). According to Yin (1994), case-study research is an empirical enquiry that investigates a contemporary phenomenon in a real-life context, especially when boundaries between phenomenon and context are not clearly evident. There is a need for more case studies, especially of exploratory type, to redress the lack of theory building and to identify and examine a large number of such cases to enhance external validity (Montealegre, 1999). Further, given the little empirical knowledge on e-banking in Indian organizations, and the exploratory nature of our study, a qualitative case-study approach was considered appropriate for our research. Therefore, in order to achieve our research objectives, we conducted an exploratory case study of a leading private-sector bank in India, called International Hope Bank (IHB). Because of a nondisclosure agreement, the name of the bank has been disguised.

We used open and semistructured interviews with the Senior executives in charge of IT, e-banking, and e-security; and the President in charge of operations in the bank. We also visited several sites of the bank to get first-hand knowledge of Internet-based applications deployed at the central office of IHB and at its branches. Wherever available, the interview data obtained through key informants was supplemented with archival data such as annual reports, IT strategic plans, and other related documentation. Use of multiple informants and use of archival data helped us cross-check pertinent information and verify the reliability of data obtained.

## 6. THE ORGANIZATION

International Hope Bank (IHB) was one of the nine new private-sector banks that came into being in October 1994 consequent to the financial sector reforms that swept the country in the mid-90s. "Over the last 10 years the emergence of new private sector banks such as IHB has had a significant positive impact on the efficiency and efficacy of the banking system in

India,” said the CEO. IHB has 104 branches in 34 cities, and about 300 ATMs offering direct banking services and value-added services to the customers. IHB, whose data center is ISO 9001: 2000 certified, employs 1400 people across its branches and offices and has been rated first among India’s best banks, according to the survey done by Financial Express, a leading business daily of India, in February 2001. Global alliances, advanced technology, and highly skilled professionals have enabled IHB to offer international standard products and services at competitive prices. “Today our customers have a choice of access—the customer can access his/her account from anywhere in the world,” said the President of the bank.

## 7. INFORMATION-TECHNOLOGY INITIATIVES

Ever since its inception in 1994, IHB has believed in the maxim that technology will be a key differentiator in a highly competitive market. “Therefore, we have been very focused in implementing technology that would enable rapid packaging and deploying of products, enhancing the reach to customers on a 24/7 availability, standardizing processes and thereby the ability to handle large transaction volumes at an optimum cost,” said the Senior Vice-President (IT). All the 104 branches and 300 ATMs of IHB spread across 34 cities in India are connected in real time to the data center located at the bank’s headquarters using a state-of-the-art data communications network and high-end Unix and Windows NT servers running Oracle and SQL server databases. According to the President, “there is a belief across the entire organization, right from the Chairman and Board of directors down to the juniormost employee, that good technology is a prerequisite for banks of the future. This belief is reflected in everything we do. All aspects of our business today are predominantly driven by IT.” This infrastructure also has a high level of redundancy to take care of potential hardware and telecommunications failure as well as disaster recovery situations and has recorded availability to customers of 99.8% over the last few years. This enabled the bank to provide a seamless capability for anywhere, anytime, any service banking across the country. Moreover, delivery capabilities were made scalable as the volumes increased. The IT platform at IHB met all the needs of the competitive business and IT was no longer a cost center. “The launch of our Internet banking is part of our strategy to provide our customers with world-class products and best service levels. For the first time in India, NSDL demat account-holders of IHB can look up their equity stock holdings and transaction details on the Net,” added the President. Recently, a global professional journal, the *Microbanker*, awarded IHB as the best in microbanking in recognition of outstanding implementation of micro-computer-based applications, exhibiting innovative use of technology, effective deployment of information resources, and improved economy of operations.

## 8. BUSINESS STRATEGY AND INFORMATION TECHNOLOGY

IHB’s business revolved around three major strategic business units: retail banking, corporate banking and treasury. The retail banking unit offers a vast variety of products and services including mortgage loans, automobile loans, education loans, and so on, to retail customers numbering close to 1 million. This customer base is serviced through the technology-intensive delivery channels, including branches, ATMs, internet banking, and so on. The corporate banking unit caters to the banking needs of a wide spectrum of companies, large and small. Treasury, the most profitable strategic business unit, is an active player in the foreign exchange, money market, and securities trading in the country.

Right from its inception, the top management of the bank had envisioned an IT-enabled organization to deliver real-time 24/7 service to its customers, with a multiplicity of delivery channels. Said the President of the bank, “With interest margins and consequently interest income reducing and fee income getting thinner, we realized very early on that we had to contain our costs in every possible way if we were to sustain our profitability and remain competitive in the market. That we have achieved this objective is brought out by the fact that the bank, with a balance sheet size of nearly US dollars 2 billion, has only around 1300 employees on its rolls and an average retail banking branch, with a business level of US dollars 10 million is managed by a team of 5 to 6 employees. We could not have achieved this quality of customer service and efficiency of operation without a strong IT backbone. IT was a strategic imperative, necessary for our survival.”

“The IT architecture of the bank has been designed in such a way that the customer interface is achieved through multiple delivery channels that are directly or indirectly enabled using Internet technologies,” said the Senior VP (IT). These delivery channels enable on-line delivery and servicing of several banking products of the bank such as retail, corporate, treasury, and investment banking. Furthermore, these applications are connected with internal and external databases relating to treasury, retail assets, CRM, etc. The overall architecture in terms of services offered by the bank and the technology infrastructure is presented in Figure 1.

Apart from a robust centralized banking application system covering retail banking and corporate banking and strong technology support for the Treasury operations, the bank has also implemented some specific technologies that have given it tremendous competitive advantage in a number of emerging areas of banking business in India. Two such initiatives in this area are presented in this section.

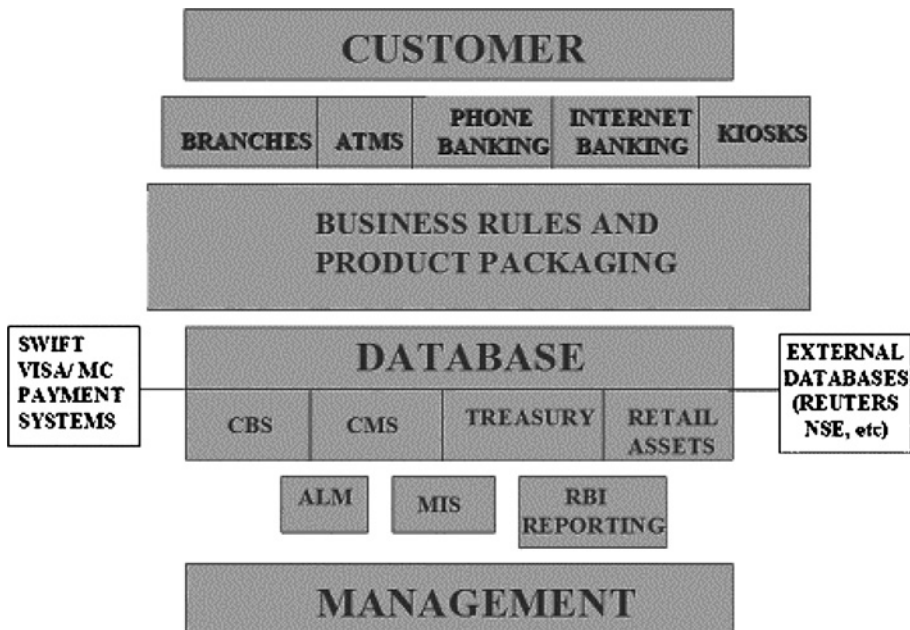


Figure 1 Business-technology alignment model of IHB.

## 8.1 Cash-Management Services

Given the size of the country and the intrinsic inefficiencies in the banking system, banks like IHB recognized the need to build an IT-driven capability for faster collection and payment of checks on behalf of its corporate customers across the country, collectively known as *cash-management services*. A specific software application was deployed to meet the requirements of the cash-management services business, with a straight-through interface to the bank's central database at the bank's headquarters. "We were able to achieve significant early success in this business thanks to the real-time connectivity of our branch network covering 34 cities in the country and connected to the central database at the bank's headquarters," said the Head of Cash-Management Services. Furthermore, according to the Senior Vice-President (IT), the bank also entered into a correspondent banking relationship with other banks to extend this service to over 200 cities and towns across the country. Specific software application was deployed to meet the requirements of the collections and payments business, together known as cash-management services. Large corporations with operations across the country and large receivables and payables requirements benefited enormously from this facility.

A large company in the fast-moving consumer-goods (FMCG) segment with stockists and distributors across the country mandated the bank to collect checks from its stockists and distributors, process these checks through the local interbank clearing, and electronically remit the funds so realized to its central pool account maintained at one of the bank's branches in Mumbai. The specific technology deployed by the bank to meet this requirement reduced the time taken for realizing funds to less than 3 days from an earlier average of 9 days. Therefore, the customers of the bank were able to manage the working capital better. In another example, a large mutual funds company with a requirement to pay interest and dividends at prespecified periodicity to its customers across the country used the technology capability. IHB ensured that such payments were electronically transferred to the beneficiaries in the quickest possible time. This eliminated the need to write or print thousands of pay orders, and also significantly improved the customer-service delivery of the mutual fund.

As per the published Annual Report (2002–2003) of the bank, "IHB's global cash management service handles customer's volume business like ensuring collections, management of debtors and creditors, subscriber and vender payments without too much human intervention. And, all at low cost both to the customer and bank." Our study reveals that at least 7 other banks in the country have undertaken this business as a major focus area, including two foreign banks and two government-owned commercial banks. However, the foreign banks have limited presence across the vast geography of India, and government-owned commercial banks do not have as comprehensive a technology capability as IHB and its peers. New private-sector banks such as IHB have intrinsic advantages on both the above counts and have therefore gained the potential to command a large share of this business in next few years.

## 8.2 Depository Participant Business

Most salaried citizens and businesspeople in India participate in the purchase and sale of shares of companies in the equity stock market. Until 1998, such purchases and sales of shares were done based on physical shares issued by the companies. Consequent to the setting up of the National Securities Depository Limited (NSDL) in the country, all



such share certificates were converted into electronic form to be maintained by NSDL as the custodian. Banks and financial institutions were permitted to become “depository participants” of NSDL and to service customers through their branch and delivery network, aided by a strong technology backbone. “Thanks to the very high level of technology deployed by IHB, it is today one of the largest “depository participants” in the country, with a customer base of 150,000,” said the Head of the Business Unit. All purchases and sales of shares were recorded through the bank’s computer system either electronically or through a written delivery instruction submitted by the customer at any of the bank’s branches. According to the Senior VP (IT), this proved to be a tremendous boon to the customers and a significant revenue generator for the bank.

Our study reveals that only a few of the banks in the country, all in the private sector like IHB, have taken to this business aggressively and have been extremely successful. In our assessment their success could be attributed to their high level of technology adoption as well as the flexibility in their structure and strategic desire to absorb lines of business like the depository participant business, which are not banking *per se*, but are highly profitable and will help the bank to expand in the future to be a financial supermarket.

## 9. DEPLOYING INTERNET-BANKING APPLICATIONS

India has been one of the fastest adopters of information technology, and this has provided a tremendous impetus to banks like IHB to deploy the latest in technology, particularly in the Internet and e-commerce arena. The need for deploying Internet banking had been very strong, considering that (a) a significant part of the urban population in India today is employed in the information technology industry, and so have easy access to the Internet; and (b) there is a huge expatriate Indian work force engaged in various professional pursuits around the world, who would like to be in touch with their bank in India over the Internet. In addition, and thanks largely to the proliferation of Internet and cyber cafes in the country, accessibility to the Internet and therefore the need to use it to conduct business has been felt more strongly in India than even in some of the developed countries in the world. IHB was one of the first banks in India to implement Internet banking in the year 1998, when the whole concept was in its infancy among banks across the world. In the years that followed, the functionality has been expanded constantly based on experience and feedback from customers. “Today the bank has over 100,000 customers using its Internet banking facility, processing over 2000 transactions every day,” said the President.

To begin with, Internet banking was deployed more as a measure to contain costs, because the cost of processing a transaction over the Internet was a fraction of the cost of handling the same transaction across the counter in a branch of the bank. This, of course, was in addition to the convenience factor of having Internet banking available around the clock from anywhere in the world. Using the Internet banking facility a customer of the bank could perform a whole range of banking transactions, such as enquire on the balances in his accounts, review past transactions in his bank account, open fixed-term deposits, renew or roll over term deposits, download the statement of accounts in a prespecified format to his personal computer for reconciliation, request for checkbooks and bank statements, and transfer funds between accounts. The transfer of funds could be (a) between the customer’s own accounts in IHB, (b) from his or her account in IHB to any other account in IHB, or (c) from his or her account in IHB to any other account in any other bank. The last type of funds transfer has been implemented in tandem with the electronic-funds transfer

facility offered by the Reserve Bank of India, the country's monetary regulatory authority. The business volumes had exponentially increased in the recent past, with retail customer accounts rising by 20% and the on-line customers increasing by 53%.

### **9.1 E-Payments for Business-to-Customer (B–C) Transactions**

The comprehensive features and functionality offered by Internet banking enabled the bank to provide world-class customer service, at the same time improving efficiency and reducing the cost of operations. "However, it was very clear to the bank that if the Internet as a delivery channel has to be sustained by the bank over the long term, it must generate revenues on its own," said the Product Head of E-Business. The bank realized almost 4 years ago that the only way this could be achieved was through collaborative initiatives over the Internet. Accordingly, it set out on a mission to work with a number of companies for processing payment over the Internet. With this service, branded synonymously for easy identification with its high-profile Internet banking brand, the bank received a fee ranging from 5 to 30 Indian rupees per transaction. To begin with, IHB worked with telephone companies (mobile telephone service providers) to offer this facility, and then extended it to include Internet shopping, railway ticketing, payment of insurance premiums, and so on. IHB designed and built an Internet payment backbone with standard available tools, including Web services, to connect the Website/UNIX server of the collaborating company to the payment infrastructure. The bank also worked with a number of Internet shopping portals, such as rediff.com, indiatimes.com, and so on, to facilitate payments for goods purchased over the Internet. Payments of college and university fees, purchase of admission forms, and so on, were facilitated for colleges/universities with whom IHB has a relationship. According to the Product Head (e-business), IHB has so far tied up with nearly 23 service providers, such as utility companies, insurance companies, telephone companies, railways, shopping portals, and so on, with which e-payments for B–C e-commerce transactions are facilitated in real time.

From our comparative study of other banks, we observe that IHB has been one of the pioneers in the B–C payments; other peer banks in the private sector have also been pursuing similar initiatives. In fact, one of the competing banks has launched an on-line equity-trading portal for purchase and sale of equity shares in the country's buoyant equity stock market. This portal is connected in real time to the back-end banking system for payments into or from the customers' account with the bank towards equity shares sold or purchased. Another collaborative payment initiative, called billjunction.com, has been set up by one of the competing new private-sector banks to facilitate payment of bills over the Internet connecting multiple banks and multiple utility companies. The Senior Vice-President (IT) of the bank said "We are closely monitoring the customer response to such initiatives and would like to keep our options open at this stage to either set up a similar venture of our own or collaborate and interface electronically with other banks who have already invested in the infrastructure."

### **9.2 E-payment for Business-to-Business (B–B) Transactions**

The bank had also deployed software to enable its corporate banking customers to effect payments electronically. A corporate client of IHB, for instance, would be able electronically submit to the bank details of payments to be effected to its suppliers. The bank

would receive this information electronically; hold it in its database and action the payment instruction on the due date as mandated by the client. Similarly, checks given to the bank for collection from any of the company's distributors across the country would be available for viewing by the client over the Internet, including details of checks and future cash flows. More recently, the bank considered working on extending the Internet payment backbone to link with B-B portals that provide aggregation, auction, and such other services.

Unlike the B-C payments, B-B payments using the Internet are not commonplace in the country. A number of corporate customers confirmed that they use the Internet for sourcing and for determining the best price but prefer to place their orders and effect payments through traditional modes of payments using the banking channel. The only electronic payments pursued relate to bulk payments as detailed in the earlier paragraph. IHB and its peer banks in the private sector are indeed on par in this regard.

## 10. CHALLENGES FACED IN DEPLOYMENT

While deploying the information-technology architecture, the bank had clearly envisaged the dominant role that the Internet and e-payments would play in the future of banking. "No part of the bank's technology had to be 'retrofitted' to interface with the Internet, and this helped enormously in keeping the capital expenditure to the bare minimum when extending the bank's information technology infrastructure to embrace Internet," said the Product Head of E-Banking. The facility of one single integrated back-end database for the bank contributed significantly to easing the complexities of building an interface to the Internet. Equally important, the entire technology delivery platform was built with TCP/IP communication protocol, UNIX and Windows NT operating system, and relational databases such as Oracle and SQL server. These are ideally suited to the Internet environment and hence facilitated the overall integration of the bank's back-end systems to its Internet delivery capability. "Our IT infrastructure is only 10 years old. And from the very beginning we were committed to TCP/IP, UNIX and relational database such as ORACLE as our platform. Consequently, integrating with the Internet world in real time was relatively painless. The cost, time, and effort involved was significantly lower as compared to technology enabled banks in the Western countries who had to cope with the mainframe legacy and consequently issues of integration with Internet applications," said the Senior VP (IT).

In terms of choice of platform, our study shows a similar trend among other new private-sector banks in the country. Being recent entrants (10 years or less), they have all deployed an IT platform that is intrinsically well suited to deliver on the Internet. The large government-owned commercial banks have started implementing a centralized banking application system as well as Internet banking only recently, and they have learned from other banks like IHB, who are on the leading edge of technology. However, given the customer base, almost 75% of whom are not computer literate, and a much larger branch network, successfully deploying technology in the government-owned commercial banks is a far greater challenge, and in some cases, more difficult to justify in financial terms.

Ensuring the highest quality of security over the Internet and thereby giving the customers confidence about the security and integrity of their transactions was an enormous challenge. IHB used the services of leading consulting firms of international repute to design and deploy its e-security infrastructure. The physical layer is comprised of perimeter firewalls, corporate firewalls, mail and proxy servers, and so on, as shown in Figure 2. The perimeter firewall acts as a first-level filter for all those attempting to access the bank's servers. The

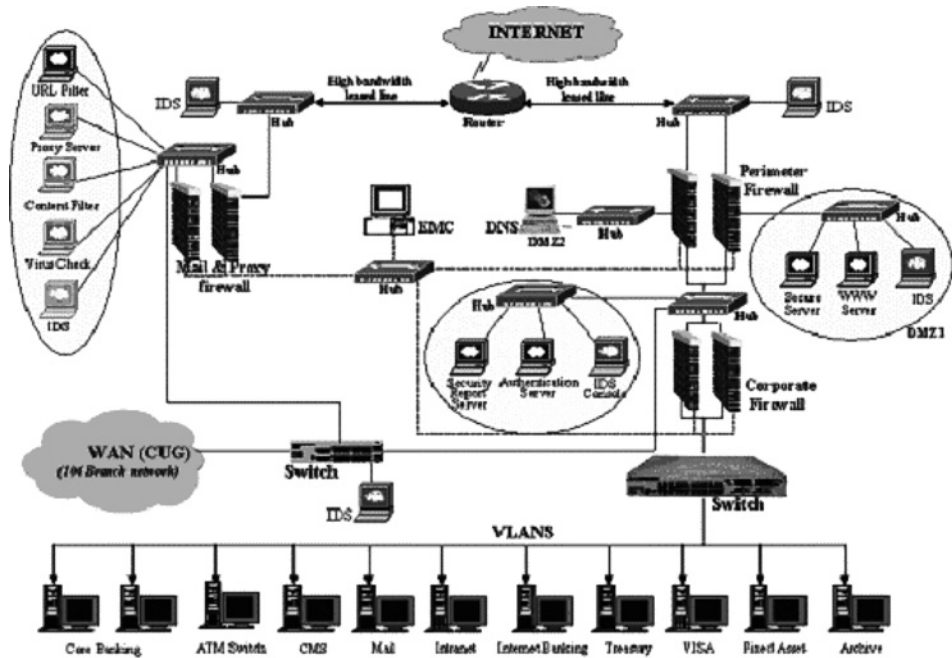


Figure 2 E-security infrastructure of IHB.

corporate firewall is the second and significantly more rigorous filter, for both employees and customers who wish to access the bank's mission critical systems such as Internet banking, ATM transaction switch centralized banking application system, and so on. As a third level of security, all the mission-critical servers are encased in a virtual LAN thereby ensuring that customers and employees cannot access the data in any of these servers directly, even if they break through the firewall. Appropriate intrusion detection systems have been installed to detect and bounce off any suspected hacker. Through the ethical hacking practice, explained elsewhere in this article, the security is kept as current as possible.

In addition to the physical security layer, the bank has also implemented a 128-bit encryption and plans to implement PKI and digital certificates as part of its planned initiatives. "We have engaged a leading Internet security company to undertake 'ethical hacking' on an on-going basis and provide antidotes to potential security breaches identified as part of the 'ethical hacking,'" said the Assistant Vice-President (IT). In the bank's experience, e-security is the most vulnerable and consequently the most important component of the entire Internet banking and e-payments initiative. "And being an emerging and constantly changing area, we decided to employ qualified consultants and external agencies in our security initiatives," said the President.

One of the unpredictable aspects of any Internet deployment is establishing the pattern of usage, the time of day for peak usage, and the transaction types most frequently used, all of which contribute towards assessing the bandwidth requirements and eliminating bottlenecks in the application system to ensure good response time during any time of the day. "We did struggle with the issue for almost 6 months," said the assistant VicePresident (IT).

Deploying the complete Internet hardware infrastructure on a gigabit Ethernet LAN and providing multiple high-bandwidth connectivity through Videsh Sanchar Nigam Limited (VSNL), the single largest Internet gateway service provider then in India, largely resolved this issue. Adequate redundancy had been ensured by providing multiple channels of connectivity such that even in the event of one link failing, the service level to the customer of the bank would not be impacted in any way.

“Thanks to the efforts of the Government of India in enacting the IT Act, 2000, the bank’s interest was protected significantly from a legal stand point in respect of Internet banking and e-payment transactions,” said the Assistant Vice-President (IT). According to the Senior VP (IT), the bank employed one of the best legal firms in the country specializing in cyberlaw to ensure full compliance with the IT Act, 2000 and to ensure that, for transactions originated over the Internet, the rights and obligations of both the bank and its customers are protected through (a) terms and conditions that can be viewed on-line during transaction processing and (b) the mandate that the customer enters into with the bank when signing up to use its Internet Banking and e-payment facilities.

Our study revealed that building a robust Internet payment backbone to allow the bank’s Internet infrastructure to seamlessly connect to e-commerce providers including the government, utility companies, railways, insurance companies, mutual funds, shopping portals, and so on, was a key differentiator in providing significant competitive advantage to the bank in its Internet banking and e-payment initiatives. The bank had built its Internet payment backbone using internationally recognized products and a framework offered by leading companies in the world. Building this backbone in-house has helped the bank maintain the intellectual copyright and also provided the unique capability to modify the software rapidly in line with the changing trends in the marketplace.

According to the Product Head (e-business), during the course of deploying the Internet banking and e-payment capability, the bank recognized very early that the usage and hence the cost–benefit could be enhanced only by increasing accessibility. “Easy access to the Internet is not possible for a sizeable segment of our customers and we overcame this problem in a very innovative way by implementing a Web-kiosk facility which we are currently deploying in our branches and offsite ATM centers,” added the Product Head (e-business). The Web kiosk is a PC with a customized browser using industry standards interfaces that allow the bank’s customers to transact from the Web kiosk which rides bandwidth available in the bank’s own wide area network (WAN) that connects all its branches and ATMs across 34 cities in the country.

The Senior VP (IT) believes that Web-based technologies have become all pervasive and the sole interface for all types of technology deployed in the bank. Accordingly, the bank was planning to Web-enable all its applications using industry standard Web services architecture with a universal interface for all the delivery channels. There was a compelling need to deploy a state-of-the-art customer relationship management (CRM) system that enabled the bank to personalize its Internet banking depending on the customer’s preferences and product needs. The bank is also working on an integrated Web service delivery that would facilitate personalization.

With the rapid boom in the stock markets in India and the need for equity trading to be available to retail customers, there is an imminent need to deploy Internet-based equity-trading capability either through a real-time interface with Web portals that are already active in this space or, alternatively, deploying an Internet equity-trading portal of its own. “This has become a strategic necessity as we foresee, based on the experience of the developed countries in the Western world, that an average Indian customer will want to

invest in an equity stock portfolio to maximize his returns in the same way as he would want to keep some of his savings in the bank to ensure easy liquidity,” said the President. “In the future we would also be required to sell insurance and pension products for which the bank is uniquely positioned, thanks to its integrated technology delivery architecture,” he concludes.

The bank has recognized information technology as a strategic imperative and had the full support of the Board of Directors and the CEO. The architecture for information technology was drawn up based on a clear understanding of the business needs, priorities, and strategy. This helped the bank to align the IT deployment with the business and phase out the implementation and consequently the capital expenditure. Some of the basic architecture decisions, such as the use of TCP/IP protocol, Unix, and relational databases in the first phase of technology deployment by the bank were very far sighted indeed, as the bank was able to quickly integrate and enhance its technology infrastructure and align its delivery capability to the widespread use of the Internet in the subsequent years. The IT architecture of the bank is very modular and hence scalable both in terms of its ability to handle larger volumes and its ability to absorb newer and emerging technologies. Security issues in the Internet and e-banking environment have been addressed and implemented well, by inviting outside experts to design and deploy the e-security infrastructure as well as ensuring compliance with the IT Act prevailing in the country.

## 11. IMPLICATIONS FOR DEVELOPMENT

India is a large country with its population widely dispersed. The banking system has to meet the requirements of urban India, where Internet has become a way of life, particularly among the professionals and employees in technology companies, all of whom have easy access to the Internet at their workplace and, in most cases, from their homes as well. This segment of banking customers, whose numbers are growing significantly every day, (a) have demonstrated an immense appetite for using the Internet and other electronic delivery channels, and (b) have moved their banking relationship to banks like IHB that offer a variety of electronic delivery channels such as the Internet. This customer segment is young, with a high propensity to save and borrow which is consequently very profitable to the bank. Acquiring and retaining such customers, therefore, is a compelling business goal. Consequently, Internet banking and electronic delivery has become a strategic imperative for banks in India that wish to survive and grow in an intensely competitive arena. With regard to rural India, central- and state-government-based service deliverers have gone to electronic mode. Besides normal banking operations, banks such as IHB have shown the way by participating in the delivery of services in select states. Therefore, banks in India are looking at e-banking initiatives in place of brick-and-mortar branches.

In the case of deploying technology, although the new private-sector banks in India, such as IHB, are nimble and able to increasingly attract and retain profitable customers largely through their Internet banking capabilities, the large public-sector banks, which are state owned, and who commanded 75% of the banking market share in India, have not been able to respond with the same speed and agility. These state-owned banks have enormous difficulty to bring about technology-driven strategic changes in their business, because of several inherent organizational impediments that tend to dominate their decision-making process. Therefore, new private-sector banks like IHB demonstrated a very high degree of “managerial actionalism” (Montealegre, 1999) by using state-of-the-art information

technology to pioneer an efficient and effective banking business model akin, and in some ways even superior, to those prevailing in the OECD countries. The spectacular success of these banks and their consequent gain in market share from the state-owned public sector banks over the last 8 years has truly been an eye-opener. Until the emergence of banks like IHB, the public-sector banks were largely governed by the characteristic of “environmental determinism” (Montealegre, 1999); that is, all aspects including their work behavior and technology decisions were governed by the strong influence of the prevailing environment, in particular the high level of government ownership and control. However, with the success of the new private-sector banks like IHB and the consequent change in the environment, the public-sector banks were compelled to move to a stage of “system interactionism” (Montealegre, 1999), where the forces of the external environment are powerful determinants of the internal environment, in turn providing the context for most actions. In fact, in the recent past, the country has witnessed a significantly increased spending by the public-sector banks on information technology and business transformation with a view to gear themselves up to face the challenge posed by private-sector banks like IHB in delivering services through different channels across the country.

New private-sector banks in India like IHB have demonstrated, through their various technology initiatives, that world-class technology can be deployed by banks in India to enhance customer convenience significantly, facilitate a lower-cost, more efficient, and scalable operations, and at the same time ensure vastly improved controls in conducting the business. The public-sector banks have therefore been encouraged to emulate the same model. This action would have far-reaching consequences to the overall economic-development process in the country, as the public-sector banks, thanks to the business philosophy that they have eschewed over the years, have a strong presence in rural India through their extensive branch network. A good technology backbone would enable the public-sector banks to more effectively perform their role of financial intermediation and credit disbursement to the rural areas, both of which form the engine for sustained economic growth.

Equally important are the initiatives in the regulatory context unveiled by the Reserve Bank of India (RBI), the country’s central bank. One such initiative is a state-of-the-art technology-driven real-time gross settlement system (RTGS) to handle all large value payments between banks across the country electronically. Experience worldwide shows that only the developed countries have undertaken deploying such nationwide payment networks, and that such a system tends to have a significant impact on the efficacy and sophistication of the banking system in the country. RTGS is already operational in the metropolitan areas and large cities, and is expected to be rolled out to several cities around the country in the years ahead. As a prerequisite to RTGS, all banks in the country will be required to upgrade their technology to a level where they can interact with the RTGS system in real time. This presents a compelling case for the public-sector banks to upgrade their technology and is much in keeping with the view that the “Networld will not eradicate poverty and deprivation, but will create a more supportive and knowledgeable environment, where the nation and the enterprises in that nation engage with and incorporate technology in its goals of accelerating economic growth for a vast country like India.

## **12. CONCLUSION**

In the emerging business environment, banks have to be proactive to offer products and services to customers through seamless integration of internal processes and external business

partners. IHB seems to be a forerunner among Indian banks and is leading the way in aligning IT with business strategy, which has shown enormous benefits to the customers and eventually economic development. Furthermore, the emergence of new business models for banks leveraged through IT and the lead role taken by private-sector banks like IHB has brought enormous pressure on the government-owned commercial banks to review their business models and adopt a higher level of technology and alternate delivery channels in order to maintain their leadership for economic development.

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