

Technological Transformation of Transactions

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Abstract

Automation, Communications and Computing, the three pillars that have changed the landscape of the transactions segment over the last 25 years. Add to that the Internet revolution, business and consumer transactions have seen a sea change involving finances. This research article chronicles the progress made in the sector from primarily on banking perspective. It also looks at other complementary technological innovations that have aided and abetted the ease of the transactions processes.

While regulators and public sector banks kick started the transformation process, it soon percolated down to the private and consumers segments. Of course, technology has been the main driver and its adoption has been the key to the success of process implantation.

The transactions segment has come a long way indeed. From passbooks to passwords, it has eased the process of doing business as well as conducting our daily lives. Whether it be your daily grocer, a farmer in a remote area or an aspiring entrepreneur, no more do they see transactions as a hindrance. In fact, it is a boon.

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Introduction

Technological change has come to touch every aspect of our life. This is especially true in the Indian banking sector where technology has transformed the nature of transactions beyond recognition. Being the backbone of the Indian economy, whether it be industry, agriculture or services, banking plays a critical role in the development of the nation. Understandably then, the adoption of technology and its accompanied innovations in the Indian banking system has changed the way businesses and consumers alike transact. Later, the Internet revolution gave a new impetus to both business-to-business (B2B) and business-to-customer (B2C) transactions relationships

It all began in the early '80s when banking regulators began to set up a slew of working groups and committees to improve the transaction process. Using technological advances, the pace of transactions gradually picked up and is now comparable to international standards. The banking revolution was a precursor to many other changes that has made life easier while performing transactions. Today, at the click of a button transactions take place at the speed of the Internet. Geographically too, technology adoption has enabled the spread of banking to every nook and corner of the country. Let's take a look at this fascinating journey that has brought the Indian transaction system at par with the world.

Objectives

- To emphasize on the role of technology in the banking sector in india
- To show the technological growth in the banking sector
- To enlist the various improvements in banking sector in India
- To show the evolution of banking sector and the significance of technology to transform the sector.

MICR leads the way

In the banking sector, the whole process of tackling transactions was kick started in 1982 with the setting up of the Working Group on introducing MICR/OCR Technology for Cheque Processing. At that time, it took nearly 3 days and 7 days respectively for local and outstation

cheque clearance. At times it would nearly take two weeks for clearing cheques from remote areas. The Working Group's recommendations included the introduction of 'item processing' (sorting and listing of cheques with the help of computers) in three phases.

- In the first phase in the four metropolitan cities viz. Delhi, Mumbai, Kolkata, Bangalore with the help of MICR technology
- In the second phase all state capitals and important commercial centers.
- In the final phase national clearing to be introduced by dividing the country into four Regional Grids with headquarters at Mumbai, New Delhi, Chennai and Calcutta

“There are the magnetic inks bar codes printed on the bottom of your bank's cheque leaves. These bar codes are known as MICR code, an abbreviation for ‘Magnetic Ink Character Recognition’. Actually, the MICR is the name given to the technology used in printing the code. In India in 1980 this unique system of MICR based cheque clearing system was introduced first time. Apart from being a security bar code to protect your transaction, the MICR code is also an indispensable part for online money transfers. Every bank branch is given a unique MICR code and this helps the RBI to identify the bank branch and speed up the clearing process.” (simplydecoded, 2012)

The introduction of MICR cheques speeded up the transfer of money for intra-bank, inter-bank, intra-city and inter-city transfers. This technology was a precursor to CTS 2010, explained later. The effect of MICR introduction was tremendous:

- Computers reduced the amount of paper work and minimized human effort.
- MICR Technology lead to faster clearing of cheques with a shift from manual handling to automation
- Enhanced security and less risk for any type crimes (forging of signatures)
- Easier identification since the first three digits (1-3) denoted the city and the 4-6 digits denoted the bank. The last three digits denoted the branch code

MICR technology was given a further fillip from the Committee on Mechanisation in the Banking Industry (1984). With respect to MICR it proposed that:

- Banks to be in readiness for the introduction of MICR Clearing at the four metropolitan cities by assessing their requirements for encoders, adopting standardised cheque forms and reorganising work procedures where necessary, and training staff down to the branch level.

These were control measures so that the transactions could be kept in one place at a particular “service branch” which increased automation so that MICR technology could be used and organized at that particular branch so all transactions would be done faster. It meant:

- Standardization of transactions
- Faster Clearing Services and a Control Mechanism to be set up
- Base for expansion to other cities
- Platform to implement MICR all over India

(Simply Decoded, 2012)

Communications and connectivity

It was the banking sector that took the next leap in the transaction sector with the introduction of BANKNET, an idea fueled by the Committees on Communication Network for Banks and SWIFT implementation (1987). BANKNET involved setting up of a X.25 based packet switching network.

BANKNET was to be implemented in two phases. In Phase I the computer systems available in the Head Offices of the Public Sector Banks in the four metropolitan cities would be connected to the four IBM Mainframe servers. In the second phase connectivity could be gradually extended to eight to ten banking intensive centers and to a hundred centers over a three-year period. The applications that were identified were:

- inter-bank fund transfers on banks' own account and on customers' account;

- inter-branch funds transfers on banks' own account and on customers' account;
- currency chest transactions;
- government transactions;
- improvements in payment systems by facilitating automated clearing services and
- any branch banking, etc.

The committee also recommended that India should join the SWIFT (Society for Worldwide Interbank Financial Telecommunication) Network for the transmission and reception of international financial messages. It also noted that BANKNET should strive to emulate SWIFT in matters of data security, encryption, and authentication and SWIFT message standards which are internationally accepted should be adopted by BANKNET.

While MICR implementation was based on introduction of multiple hardware components, BANKNET heralded the use of online software that would rapidly increase the speed of transactions. It basically meant that transactions can be done from anytime, anywhere.

Complementing with computerization

In 1988, the Committee on Computerisation in Banks further reinforced the concepts of the earlier committees with a plethora of recommendations to speed up transactions even more. It mainly recommended:

- Computerisation of the settlement operations in the clearing houses managed by Reserve Bank of India at Bhubaneshwar, Guwahati, Jaipur, Patna and Thiruvananthapuram.
- Operationalisation of MICR technology and the National Clearing of inter-city cheques at the four metropolitan cities.
- Branch level computerisation and the establishment of connectivity between branches.
- Improvements in customer service - introduction of on-line banking.
- Setting up a network of Automated Teller Machines (ATMs) in Mumbai. ATMs to be strategically located at airports, railway stations, hospitals, important commercial centers, as well as bank branches, to be used by the customers to perform a variety of functions such as

deposits, withdrawals, balance enquiries, statement of accounts etc., at any point of time during the day.

- Introduction of a single 'All Bank' credit card and advocated the need for its widespread acceptance by merchant establishments and usage by customers to reduce the load on cash and cheque transactions.

(RBI, 1998)

While these recommendations sought to gradually pave way for the use of computers by banks across the country eventually, starting with 2nd and 3rd tier cities and increasing the volume of daily transactions, the main takeaway that would revolutionise the transaction sector were “ATMs, Credit Cards and Online Banking”.

After the Committees recommendations there were various other technological innovations that entered India to drive faster and more secure transactions. These transactions were more on the consumer side as the transactions for businesses were already improved a lot by the development and implementation of various infrastructures in banks due to the successful recommendations by the various committees.

The ATM attraction

With the introduction of automation, communication and computing technologies within banks effectively speeding up the volume and reducing the time of transactions, ATMs announced the move beyond the doors of banks. The introduction of ATMs in the early 1990s marked a major change for speeding up transactions for the consumers. While foreign banks and private banks were first of the block (due to the restrictions on the number of branches imposed on them), they were soon followed by the public sector banks. ATM technology allowed to partially overcoming the handicap of reaching out to the customers at a lower initial and transaction costs and offering hassle free services.

Today, innovations in ATM technology have come a long way and customer receptiveness has also increased manifold. As public sector banks too entered the race for expansion of ATM

networks, the development of ATM networks not only leveraged the lowering of transaction costs, but also served as an effective marketing channel resource.

At first, ATMs were popular as cash dispensing machines. With the aid of bank-issued ATM Cards, one could only withdraw money from ATMs of banks where one had a banking relationship. For example, State Bank of India (SBI) customers could only take out money from SBI ATMs. However, as networking evolved banks came interconnected and inter-bank use of the ATM became the norm (with the restriction of free withdrawals from your non-bank ATMs).

The number of ATM installations in India has seen an explosive and exponential growth in India. The compounded average growth rate (CARG) was 29% in the period 2005-2010 and expected to be 34% in the period 2010-2016. In sheer numbers, it meant that the installation of base of 16,750 in 2005 increased to 60,153 in 2010 and was expected to touch nearly 175,000 in 2015. (Hota, 2013)

While dispensing cash was the first function of the ATM, technological revolutions would enable to perform various other tasks. However, from the personal banking perspective, the introduction of the ATM represented a cataclysmic change. It brought transactions out of the branch and nearer to the customer.

The future of ATM technology will see the use of machines without the cards. More banks are set to adopt a technology that allows their customers and third parties to withdraw cash from ATMs without a card. This new generation of ATMs works alongside a mobile-banking application that can be downloaded onto a mobile phone. In order to ensure that security is not compromised, a six-digit code will have to be correctly entered into the ATM machine before cash is released.

Evolution of Features and Functionalities of ATMs

1988-1994	Deposit of Cash , Withdrawal of Cash (Initial Period)
1995-1999	Mini Statement , Balance Enquiry (Early Developments)
2000-2001	Coupon Dispensing (First Extension)

2002-2004	Fulfilling Requests from customers (Cheque Book)
2004-2006	Ticket Booking-Railway and Airlines , Bill Payments , Mobile Recharges (Non – Banking Services)
2007 to date	Check Deposit with Scanning , Customized ATMs , Ubiquitous Multifunction , ATMs Biometric ATMs

ATMs were instrumental in changing transactions from a consumers' point of view. The amount of time taken for a particular withdrawal reduced drastically.

(CHAKRABORTY, 2013) (Enews, 2014)

Transforming transfers

With a network in place, it was time to shift to an electronically-based funds transfer system. The Committee for proposing Legislation on Electronic Funds Transfer and other Electronic Payments (1995) recommended that an EFT system could be introduced immediately by framing regulations under Section 58 of the RBI Act. A Model Customer Contract agreement to govern the banker-customer relationship with regard to EFT should be adopted by all banks participating in the system. It also said that as a long term measure, a new legislation was needed for regulating, defining and determining the rights and obligations of the system providers and users.

NEFT and RTGS

Gone are the days when the payment and funds transfer sources were limited to physical methods such as direct currency exchange or a written cheque method. With the emergence of internet and mobile banking and the emerging e-commerce opportunities, banks too have marched ahead with introducing the concept of electronic funds transfer, which is much more convenient and hassle free.

Today, electronic funds transfers allow you to exchange funds between individuals as well as organizations via electronic gateways which can be accessed using internet, computers and smart phones. Funds can be transferred instantly.

Electronic funds transfer is a much more preferred money transfer option as it allows customers to make money transfers at the comfort of their homes using integrated banking tools such as internet and mobile banking.

“National Electronic Fund Transfer (NEFT) and Real Time Gross Settlement (RTGS) allow individuals, companies and firms to transfer funds from one bank to another. You can check the RBI website for a list of NEFT and RTGS-enabled branches of your bank. These facilities can only be used for transferring money within the country. To opt for these, you need to fill a form providing your or the beneficiary’s details — name, bank branch where the account is held, the Indian Financial System Code, a unique code for identifying the branch, and the account number and type. You have to submit a cheque while opting for this facility. You can also transfer funds through net banking. These are third-party transfers and the option is available under the same header on your net banking home page.” (Gupte, 2011)

(Itsallaboutmoney, n.d.)

Debit Card

Indian customers shun the idea of debt. Enter the Debit Card. It signaled the movement away from the cash-based economy to an easier system for purchases. Essentially, a debit card allows you to withdraw cash or purchase goods or services by directly debiting your bank account. Not only did it keep spending habits in check but more importantly it got rid of the need to keep large piles of cash in your wallet. It is estimated that by 2017, debit cards will constitute nearly 90% of all card usage in India. (Wizbowski, 2014)

People do not like to keep lot of cash in hand because it is not secure. Debit card users can swipe for any product or service they want to buy at any time. The money will directly be deducted from the bank account.

Europay Mastercard Visa (EMV) chip technology is becoming the global standard for credit card and debit card payments. Named after its original developers (Europay, MasterCard® and Visa®), this technology features payment instruments (cards, mobile phones, etc.) with

embedded microprocessor chips that store and protect cardholder data. This standard has many names worldwide and may also be referred to as: "chip and PIN" or "chip and signature."

What is chip technology?

Chip technology is an evolution in our payment system that will help increase security, reduce card-present fraud and enable the use of future value-added applications. Chip-enabled cards are standard bank cards that are embedded with a micro-computer chip. Some may require a PIN instead of a signature to complete the transaction process. Aspects which makes EMV different than the traditional magnetic stripe card payment are mentioned here.

EMV (also referred to as chip-and-PIN, chip-and-signature, chip-and-choice, or generally as chip technology) is the most recent advancement in a global initiative to combat fraud and protect sensitive payment data in the card-present environment (J.P Morgan, n.d.)

The Cheque Truncation System advantage

“CTS 2010 is the prescribed standard by the RBI for cheques issued by all Indian banks to facilitate faster clearing. Instead of the collecting branch sending the physical cheque to the paying bank, an electronic image of this cheque with relevant information like the MICR code, date of presentation, presenting banks etc. is transmitted to the drawee branch by the clearing house, hastening the entire cheque clearing process.” (Shyam, 2013)

The CTS 2010 system further cut down the time for cheque clearing and made life much easier for transferring money. While the ATM and the modern cheque clearing systems enabled faster withdrawal and transfer of money, CTS cut down on physical paperwork.

Without sending a physical cheque, in its place an electronic image of the cheque is transmitted to the paying branch through the clearing house, along with relevant information like data on the MICR band, date of presentation, presenting bank, etc. Cheque truncation thus obviated the need to move the physical instruments across bank branches, other than in exceptional circumstances for clearing purposes. This effectively eliminated the associated cost of movement of the

physical cheques, reduced the time required for their collection and brought elegance to the entire activity of cheque processing.

As explained above, Cheque Truncation speeds up the process of collection of cheques resulting in better service to customers, reduces the scope of loss of instruments in transit, lowers the cost of collection of cheques, and removes reconciliation-related and logistics-related problems, thus benefitting the system as a whole.

With the other major products being offered in the form of RTGS and NEFT, the Reserve Bank has created the capability to enable inter-bank and customer payments online and in near-real time. However, cheques continue to be the prominent mode of payments in the country. Reserve Bank of India has therefore decided to focus on improving the efficiency of the cheque clearing cycle. Offering Cheque Truncation System (CTS) is a step in this direction.

In addition to operational transactional efficiency, CTS offers several benefits to banks and customers, including human resource rationalisation, cost effectiveness, business process re-engineering, better service, adoption of latest technology, etc. CTS, thus, has emerged as an important efficiency enhancement initiative for adopting technology and improving transactions undertaken by Reserve Bank in the Payments Systems arena.

(RBI, 2015)

The Introduction of Internet

Home banking

Banking on the Internet has revolutionized personal banking transactions as it brought the bank to your home. There is no need of waiting in lines or adjusting to bank hours any more, you can access your bank account online any time you want. It helps one to keep a tab on their money even on a daily basis. By keeping a close eye on your funds one always knows what is going on in your account.

Account Information is one of the functions provided by online banking. This provides a summary of your bank accounts. It also allows easy tracking of previous transactions. One can also enquire about their account balances and transfer money from one account to another if needed. This is also useful to check their savings account and also to pay of loans if needed. All this information is available anytime online which is a boon to all account holders. People can also ask for an E-statement which includes all transactions which have occurred during a particular period of time.

Transacting from Home

With banks and customers connected, the next logical step was to complete the triangle with service providers to make life easier for customers. Thanks to the Internet, a wide variety of utility bills and periodic payments can now also be made directly with a push of a button.

By using the “Pay Bills” facility, consumers can pay all their bills from their PC. This saves time and also travel cost to different service providers. Moreover, it serves as a link between the service providers and the consumers and benefits both of them. Telephone Bills, Electricity Bills, Internet/Landline Charges are a few common examples that can all be paid online. A standing instruction can also be made to pay these bills at a particular date on each month. Insurance Premium and credit card bills can also be paid directly to the respective insurance companies or banks. (CIBC, n.d.) , (Shodhganga)

Electronic Clearing System

“ECS is an electronic mode of payment / receipt for transactions that are repetitive and periodic in nature. ECS is used by institutions for making bulk payment of amounts towards distribution of dividend, interest, salary, pension, etc., or for bulk collection of amounts towards telephone / electricity / water dues, cess / tax collections, loan installment repayments, periodic investments in mutual funds, insurance premium etc. Essentially, ECS facilitates bulk transfer of monies from one bank account to many bank accounts or vice versa.”

ECS Credit: ECS Credit is used by organizations as a tool to pay employees or investors having their bank accounts in different locations. It was introduced by RBI and allows customer to directly get their salary, pension, dividend and interest into their bank account. The ECS credit payments can be initiated by anyone who needs to make a lot of payments to beneficiaries. The user has to give details of the beneficiaries and the transaction amount, date when it has to be done. This is known as the credit-push facility and is divided in parts of the year like quarterly half yearly or monthly.

ECS Debit: ECS Debit is used by an organization for raising debits to a large number of accounts (for instance, consumers of utility services, borrowers, investors in mutual funds etc. It is useful for payment of telephone, electricity bill water bills, cess/tax collections, loan installment repayments, periodic investments in mutual funds, insurance premium etc., It can be used by anyone who has to receive or collect huge amounts from a large number of people. It takes care of automatic debit to customer accounts on due dates. Customers don't need to keep a track of when they need to pay their bills. It also saves time and money. It is known as debit – push –facility or many to one and payment can be easily made through institutions either corporate or government. (Rajan P. , 2008) (RBI, 2012)

Business gets a boost

The transformation in the transaction sector by adopting technology has changed face of business finance. With the introduction of NEFT and RTGS, businesses were able to deal with customers and suppliers in a real time basis. It allowed the better management of inventories and eventually improve cash flow, an essential for business productivity. This holds true whether you are in the manufacturing, agriculture or services industries. Imagine you funds are cleared within the hour compared to days or weeks earlier? Another area where the reduction of transaction times has benefitted many is in the stock trading arena. While days to transfer shares in the early '80, today it is done within one day.

Customer's Delight

The consumer has been the main beneficiary of this change in transaction modes. Today, credit and debit cards have further eased transactions. At first, credit cards were limited to withdrawal of cash and for shopping at retail stores. Payments could be made later to credit card companies at fixed dates or later dates at a rate of interest.

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Mobile Madness

The advent and rapid growth of mobile phones in India offered another platform for banking services using the Internet medium. Nearly all banking applications on PCs and laptops soon found their way to the mobile phone. In other words, all Internet Innovations were now ported to the smartphone.

“According to 2011 figures, a mere 7 percent of Indian customers used Internet banking. Mobile banking has also been on a low-volume high-growth trajectory - the user base in 2013 was 22 million, up 74 percent over the previous year, though transaction value grew 228.9 percent over the same period.” (Mallya, 2014)

Moreover, mobile banking increases the depth and breadth for personal banking services. Especially in rural areas where the number of phones easily outnumbers computing devices. The mobile platform helps more consumers to enter as one can bank from anywhere as well as everyone has smartphones and an internet network with the emergence of 3G and 2G.

The Next Transactions

While information technology and communications technology will continue to drive customer-friendliness and ease-of-use of personal banking services, new devices would create new platforms for the delivery of these services. While the PC and laptop allowed customers to operate out of their home, the mobile aided them in banking on the move. Other innovations are also gaining ground.

Take for example, biometric ATMs. Introduced just a couple of years back, it is making rapid inroads in rural areas, where illiteracy is high. Villagers can now use their thumbprint instead of a PIN number to access their bank accounts. Add this to the Prime Minister Narendra Modi's initiative to expand the depth of bank accounts to reach every Indian as well as the Aadhar Card's biometric database, personal banking is poised for a leap in rural India.

Yet another milestone in personal banking is being crossed with the introduction of the Digital Mobile Wallet. It is essentially a mobile device that allows an individual to easily subscribe to and browse through many services, including payment cards, offers, vouchers, loyalty programs, tickets and other items they need in their daily lives. The wallet will also be able to launch an application from a retailer, bank, transport operator or another service provider.

The next stop lies with Artificial Intelligence (AI). Take, the smart watch for example. Add voice recognition facilities. So in the future, you can speak into your watch and say "Transfer Rs. 50,000 to mom". The AI in your watch will translate the message into a personal money transfer service and execute the order. A few minutes later, a message from mom, "Thanks son". A far cry from the time you live in or your parents lived in.

Conclusion

It has been a technological transformation, indeed. However, the pace and momentum of change is not slowing but increasing day by day, aided and abetted by technological changes in communications and information technology. There is more to come and technology will play a crucial role in transforming transactions.

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