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Revolution of Technological Innovation in Indian Banking Sector: Problems and Prospects

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Abstract: The technology and banking have long close association. There are various challenges and opportunities like High transaction costs, IT revolution, timely technological up-gradation, intense competition, privacy and safety, global banking, financial inclusion. Banks are striving to combat the competition. The conceptual frame of thee topic throws light on different banking innovation and use of information technology in banking. The paper studies various dimensions of technological innovations Indian banking through the review of literature. The basic research questions on the basis of which objectives are formed understand revolution of technology, innovations and its problems *e.g.* Cyber security, customer management, training etc. and prospects in Indian banking sector. A Study is an effort to provide precise direction to policy makers to plan and implement new technology. This study is primarily qualitative in nature. It has been conducted mainly on the basis of literature survey and secondary information. The key parameters for the study includes banking on technology, financial inclusion, Internet banking, Mobile banking, Customer centric services and management, Payments, Risk Management and information Security, Cost reduction, Product differentiation etc. A precise plan and implementation of suitable and useful technology can make banking and economy self-reliant. Technological innovations cannot eliminate banking system completely; it helps the community to uplift their standard of living by bringing change as knowledgeable and balanced society.

Keywords: Technology, Innovations, Banking, Customer Management, Risk Management.

INTRODUCTION

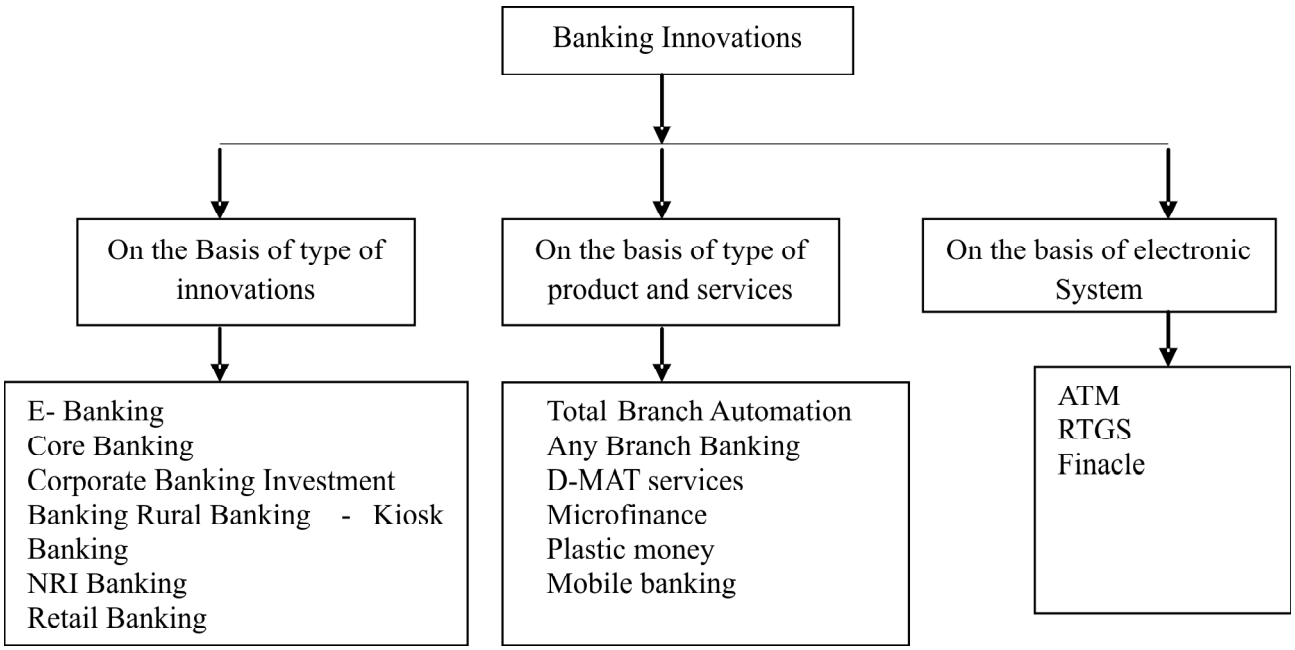
The technology and banking have long close association. Technological innovations play a crucial role in digital empowerment with the strong and tech-enabled banking system. Technological innovations cannot eliminate banking system completely; it helps the community to uplift their standard of living by bringing change as knowledgeable and balanced society. Therefore, bringing new technology in banking has become a key factor. Arun Jain, chairman, CII Banking Tech summit and executive chairman Polaris Financial Technology, said,

> "The ability of technology to bring together various aspects of banking has added phenomenal value to every day banking transactions for customers. In today's challenging times, when broadening reach and access to banking is the key to drive growth in business, innovations in technology in all likelihood will change the equation between cost and access."

There are various challenges and opportunities like High transaction costs, IT revolution, timely technological up-gradation, intense competition, privacy and safety, global banking, financial inclusion. Banks are striving to combat the competition. The competition from global banks and technological innovation has compelled the banks to rethink policies and strategies in which information technology is at the central to banking.

CONCEPTUAL FRAMEWORK

The term innovation denotes making something new. Form the time bank of Bengal in 1806, qualitative and quantitative changes have been taken place in the banking sector. Since 1935 regulation, RBI has become the central bank of India. It was since 1990 the emphasis was being placed on technology and innovations. Then the concepts like personal banking, retail banking, total branch automation etc were introduced. Apart from traditional banking activities, with the globalisation banks have to explore new avenues to increase business and capture new market. Information technology is an integrated framework for acquiring and evolving IT to achieve strategic goals. It has both logical and technical components. These technologies are used for the input, storage, processing and communication of information. Banks are looking at newer ways to make a customer's banking experience more convenient, efficient, and effective. They are using new technology tools and techniques to identify customer needs and are offering specially made products to match them.



New developments in banking includes Card-based payments-Debit/Credit card which came in 1980, Automated Teller Machine (ATM) in 1988, Electronic Clearing Services (ECS) in 1990, Electronic Fund Transfer (EFT) in 2000, Structured Financial Messaging Solution (SFMS) came in November 2001, Real

Time Gross settlement (RTGS) in March 2004, National Electronic Fund Transfer (NEFT) as a replacement to Electronic Fund Transfer/Special Electronic Fund Transfer in 2005/2006, Society for Worldwide Inter-Bank Financial Telecommunications (SWIFT) in 1973. Along with the same other innovations introduced are point of sale, internet banking, EDI- Electronic data interchange, mobile banking, MICR- Magnetic in character recognition, SFMS- structured financial messaging solution, CBS- Core Banking Solution etc. There can be no doubt the immense potential and unbound opportunities offered by advances in technology. However, there are pre-requisites and preparations which have to be made before the full benefits of the tech economy can be harvested.

REVIEW OF LITERATURE

In the 1970s and 1980s technology was gradually adopted. Throughout the 1990s new technologies emerged at a rapid pace. A bank today is in reality a processing company, nothing can happen without technology. When you examine the IT budgets of banks today, maintenance and support will be the largest amount. These overly restrictive governance systems and lack of empowerment, combined with constant restructuring and change programmes have created fatigue among many employees. (Hampson, 2014).

The top five banking challenges include macroeconomic risk, regulations, political interference, technology risk and criminality. Macroeconomic risk is the top concern for bankers, risk managers, and analysts surveyed who are concerned current positive growth is the result of artificial conditions created by low interest rates, and that the prospects of a recession/deflation are strong. Although many banks have become more risk aware and are adapting well to increasingly stringent requirements, regulation continues to be a concern for banks who must invest a sizeable amount of time, effort, and money into meeting compliance standards. Bankers are aware of the potential for greater political interference in how they manage their operations, lending policies, and taxation based on a host of macro and microeconomic factors. Large banks who fail to innovate risk losing a significant amount of business. This is especially true for banks that struggle with core legacy systems that are unable to facilitate the kind of experience, service, and product selection customers expect. Cyber attacks on key financial infrastructure could leave banks vulnerable to significant financial, regulatory, and reputational risk. (The study of financial innovations, 2015).

To stay in the game, banks need to invest in leading-edge technology and innovation while ensuring their core infrastructures offer the right foundation for real organic growth and expanded customer wallet share. Regulation has become a much more complex problem. The Digital Revolution is another area in which banks should rethink their strategy. Customers now have multiple channels for interacting with their banks. The number of traditional brick and mortar branches is decreasing rapidly. With choice comes competition and with the regulatory push towards price transparency and rapid account switching, customer churn is likely to increase. The real-time revolution is also impacting the way customers pay for goods and services. Many banks are experiencing a significant reduction in profitable business due to the emergence of new entrants such as PayPal. These dynamic companies are utilizing bank infrastructures and taking a slice of the pie while banks must pick up the bill and carry the burden of managing outdated payment infrastructures. Banks are investing millions in improving transaction banking for their corporate customers, but are they spending their money in the right place and in the right way? (Snykers, 2013).

There top 4 challenges facing banks and financial institution mentioned by Digitalist, Sap, 2015 are:

1. Not making enough money on investment, or on equity, that shareholders require.
2. Consumer expectation's pressure
3. Increasing competition from financial technology companies- FinTech This creates a big challenge for traditional banks because they are not able to adjust quickly to the changes – not just in technology, but also in operations, culture, and other facets of the industry.
4. Regulatory pressure due to which banks need to spend a large part of their discretionary budget on being compliant, and on building systems and processes to keep up with the escalating requirements.These challenges continue to escalate, so traditional banks need to constantly evaluate and improve their operations in order to keep up with the fast pace of change in the banking and financial industry today.

Security remains paramount for all banking applications, and while for many of these new entrants, security and privacy of customer data is important, it's not at the level of priority that would be needed to support a banking proposition. Regulatory compliance will also prove taxing – while legal teams can help with applying the letter of the law, this is more about an entire organization that must increasingly subvert itself to the rule of the regulator. (Analytics).

Digital environment and payment systems possess spillover positive effect on Indian economy, which is mostly informal, consumption-based and currently ruled by cash. Nevertheless, looking at the current state of necessary infrastructure, mindset and the lifestyle, it is a hurricane task, but is indeed achievable. In this context, understanding the fundamental existing ecosystem through well-thought primary data-based research will be beneficial to provide critical inputs to all stakeholders ranging from policymakers to consumers.(Financial Express) Technology is no longer being used simply as a means for automating processes. Instead it is being used as a revolutionary means of delivering services to customers. The adoption of technology has led to the following benefits: greater productivity, profitability, and efficiency; faster service and customer satisfaction; convenience and flexibility; 24 × 7 operations; and space and cost savings (Sivakumaran, 2005).

Technology is being increasingly used in delivery of banking services in recent years. However, it has also brought in associated risks of security as is evident in few high profile cyber-incidents in the recent past. There have been several incidents of theft of personal information, fraudulent use of ATMs, net banking frauds, ATM/ Debit card incidents or cases of unauthorized access to bank servers. Hence, there is an immediate need for plugging all the gaps and vulnerabilities in tech-enabled service delivery. several new small finance banks and payment Banks have started their operations in the recent past. RBI has already advised the Small Finance Banks and Payment Banks to put in place a high powered Customer Grievances Cell to handle customer complaints as part of their licensing conditions. Formulation of roles of code has a challenge of three significant developments in the banking sector – (a) the growing challenges and realities of industry mainly arising from adoption of technology; (b) addition of new customers in the formal banking structure arising from the financial inclusion efforts and (c) emergence of new entities like payment banks and small finance banks. (Mundra, 2017).

All stakeholders must work collectively to guard and fight against the menace of cyber threat. To quote our Prime Minister,

"I dream of a DIGITAL INDIA where 'Cyber Security becomes an integral part of our National Security"

when such message comes from the highest authority in the country, we need no further stimulus for action. I am sure that this Program will leave you with many takeaways and enable you to be a change agent within your respective institutions for securing the IT infrastructure as well as for educating the customers on how to avoid becoming a victim of fraud. As we go whole hog into the digital world, it is imperative that the employees as well as customers are cyber literate. I understand that some countries like Israel, have introduced cyber awareness in their high school curriculum. Perhaps, we also need to think on similar lines. (Mundra, 2017).

The Banking sector in India has become stronger in terms of capital and the number of customers. It has become globally competitive and diverse aiming, at higher productivity and efficiency. Exposure to worldwide competition and deregulation in Indian financial sector has led to the emergence of better quality products and services. Reforms have changed the face of Indian banking and finance. The banking sector has improved manifolds in terms of Technology, Deregulation, Product and Services, Information Systems, Etc. The pre and post liberalization era has witnessed various environmental changes which directly affects the aforesaid phenomena. It is evident that post liberalization era has spread new colors of growth in India, but simultaneously it has also posed some challenges. Banks have to adopt a holistic approach to fulfill the ever changing needs of customers and to grab a better market share. Development of sophisticated products with low cost technology is the key. This calls for in- depth analysis of customer needs the market and competitor trends. This analysis plays a very important role in devising new strategies, products and services. The better the banks understands their customers, the more successful they will be meeting their needs. (Shet, 2015).

Indian public sector banks that hold around 75 % of market share do have taken initiative in the field of IT. They are moving towards the centralized database and decentralize decisions making process. They posses enviable quality manpower. Awareness and appreciation of IT are very much there. What is needed is a 'big push' the way it was given in the post nationalization period for expansionary activities. IT and India have become synonymous. Whether India becomes a destination for outsourcing or it becomes a development centre is matter of debate. As far as banking industry in India is concerned it can be said that although the Indian banks may not be as technologically advanced as their counterparts in the developed world, they are following the majority of international trends on the IT front. The strength of Indian banking lie in withering storms and rising up to the expectations from all the quarters-catching up with all the global trends is a matter of time. (Sharma).

Research Question

The present paper studies how technological innovations are capturing the space in Indian banking sector? What are the problems and future prospects of revolution of technological innovations in Indian banking sector?

Statement of the Problem

This study addresses problems, prospects and impact of technology in trends of Banking. Lack of appropriate investment in software and hardware, lack of training on cyber security, personal security, financial data breaches due to lack of data encryption shows India's performance in use of technology in financial inclusion is very low. Banks have not diffused their innovation strategies in urban- rural area equally resulting in problems of increasing operational cost, transparency, safety and security issues and intense competition.

Improper alignment of technology and lack of proper synchronization will not lead to sales. Anything that does not result in sales is not meaningful. Major concerns of technological innovations in banking include customer Satisfaction and management, handling cost pressure, and increased level of competition.

Scope

The present study intends to find the determinants to improve banking by modifying existing models and finding the possibility of developing suitable technology through banks. A Study is an effort to provide precise direction to policy makers to plan and implement new technology. The broad focus areas while studying problems and prospects includes-

- Use of emerging technologies for payments
- Multiples e-Banking Channels
- User-friendly access
- Level of Acceptance
- Constraint and risk management, fraud prevention
- Internet connectivity and e-literacy
- Cost-effectiveness of services
- Increases revenue,
- Enhance customer experience and convenience
- Acceptance /electronic payment infrastructure

Principal Research Objectives

1. To study the technological innovations in Indian banking sector, and its awareness and acceptance of banking technology by people.
2. To assess problems and prospects in technology based banking services for the employees and customers.
3. To provide suggestions for effective implementation of banking innovations with cost effective, affordable, and secure banking services to bring the balance in economy.

Key Parameters

Many factors which act as link between enriching Indian Banking and technological innovations. The present study identifies following parameters of technological awareness and its implementation.

1. Banking on technology
2. Financial inclusion
3. Internet banking
4. Mobile banking
5. Customer centric services and management
6. Payments
7. Risk Management and information Security
8. Cost reduction
9. Product differentiation

Research Methodology Approach

This study is primarily qualitative in nature. It has been conducted mainly on the basis of literature survey and secondary information. Various journals, magazines, articles and published data from various issues of the Banking Sector have been referred to collect the information. Data is interpreted and analysed with the help of theoretical basis of E. F. Schumacher's intermediate technology.

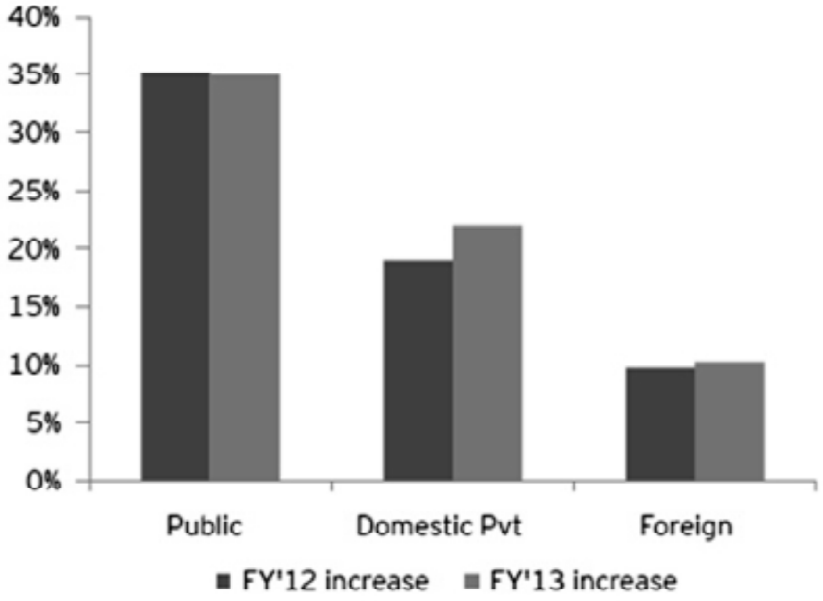
Variable Description

Table 1
Financial Inclusion

The ability of technology to bring services to people wherever they are and whenever they need them is the biggest driver of achieving comprehensive financial inclusion.	Electronic payments are accelerating this drive, and new developments, including Big Data, ubiquitous internet access and cloud computing, are expected to have enormous impact.	Regulators should consider relaxing restrictions in areas that disproportion ally affect unbanked customers, *e.g.*, through KYC, agent banking and mobile banking.	Interloper ability can create value for customers to attract large volumes.	Keeping pace with technology changes in the financial inclusion space will require significant investments in the regulatory capacity and changes made in regulatory processes.	Government can incentivize service providers to introduce technology enhanced business models that improve last mile delivery by deploying their own resources, *e.g.*, DBT payments and universal service funds.

Source: ey.com

The above are the major aspects in financial inclusion.



Graph 1: Internet banking

Source: ey.com

The above graph projects the pace of shift towards internet banking. Moreover, Urban areas had a total of 205 million internet users in October 2013 that accounts for 40% year over year growth, while

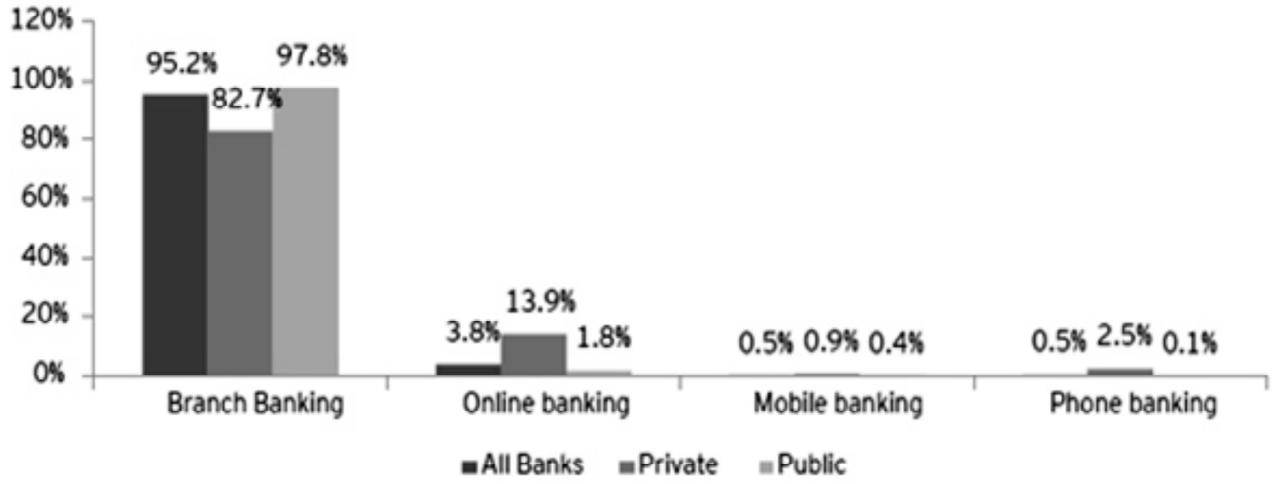
rural India have 68 million users and a growth rate of 58% year over year. Cisco Visual Index forecasts, India's internet users to reach 829 million by 2021 from 373 million in 2016.

Table 2
Mobile Banking

Customer segment	Retail (Rural)	Retail (Urban & Semi Urban)	SME & Corporate (CFO, Ops & Treasury)	Employees
Segment need	Access to Basic Banking Fund people @ native location	► Make immediate payments ► Identify localised & personalized offers ► Manage budgets & spend ► Tools to identify financial viability	► Ability to take decisions on the move ► View Cash & Overall Positions ► Keep track of markets ► Manage financial health	► Productivity enhancing tools ► Product know how/ updates ► Offsite engagement enablers
Differentiated Offerings towards segment needs	► Account Inquiry ► Basic Trxn Banking ► Remittances	► Payments (FT, SI, P2P & Immediate) ► Bill/Utility Presentment Payments ► M-shopping incl. Top Ups ► Profile Mgmt & Personalised Recco ► Personal Finance Management ► Social & Contactless Payments (NFC) ► Financial Tools & Advisors ► Location Based Loyalty/Offers ► Customer Service & Social Advocacy ► Integrated Wallet Services	► Ability to take decisions on the move ► View Cash & Overall Positions ► Keep track of markets ► Manage financial health	► Lead Mgmt & Origination ► Private & Wealth Management ► Financial Need Analysis ► Product Info
Delivery tech and device ownership	► SMS & USSD ► Feature Phones	► Mobile Internet & Apps ► Smartphones (Low /High End)	► Mobile Apps ► Phablets & Tablets	► Mobile Internet and App ► Phablets & Tablets

Source: ey.com

The above table indicates how mobile banking continues to be a focus area for all banks in India.



Graph 2: Customer Management

Source: ey.com

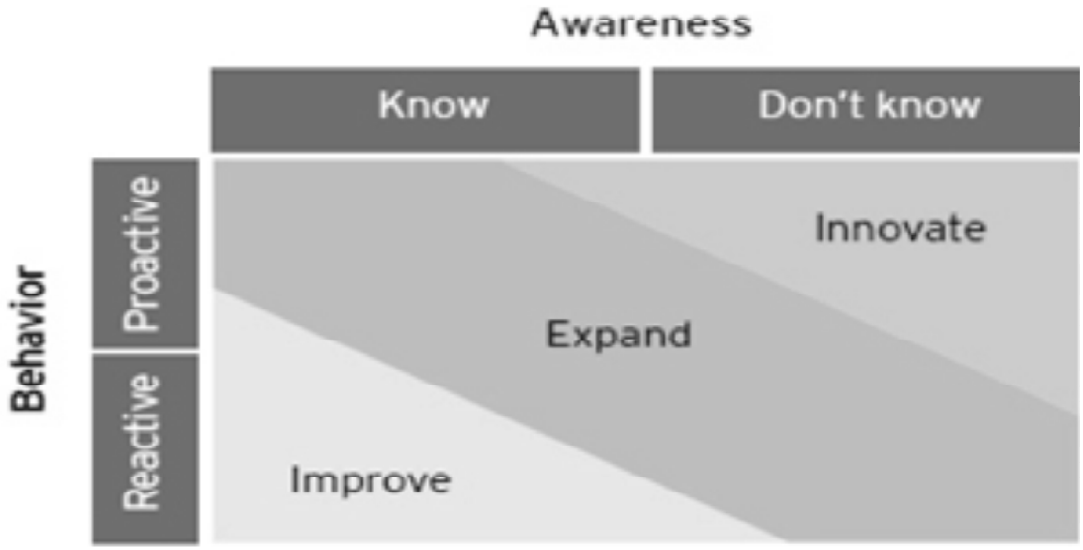


Figure 1: Risk Management and Information Security

Source: ey.com

This is a three-pronged approach to improve, expand and innovate information security to tackle hackers and fraudulent activities.

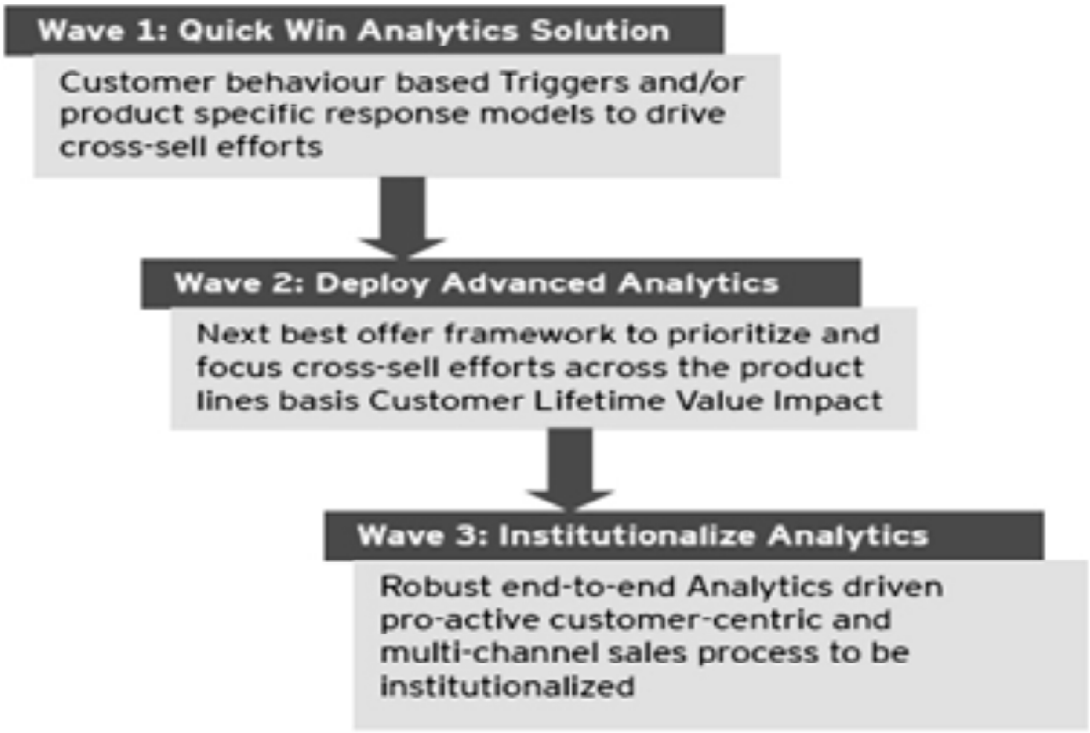


Figure 2: Business Intelligence

Source: ey.com

Banks across India are increasingly adopting business intelligence (BI) and analytics to drive their overall profitability, which is also encouraged by RBI.

Table 3
ATM and Card Statistics for April 2017

								Credit Cards		
Sr. No.	*Banks 51*	*ATMs*		*POS*			*No. of Transactions (Actuals)*		*Amount of transactions (Rs. Millions)*	
		On-site	*Off-site*	*On-line*	*Off-line*	*No. of outstanding cards as at the end of the month*	*ATM*	*POS*	*ATM*	*POS*
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
	Grand Total	109740	98073	2614584	0	31322759	481711	106578071	2327.2	331429
								Debit Cards		
Sr. No.	*Banks 51*	*ATMs*		*POS*			*No. of Transactions (Actuals)*		*Amount of transactions (Rs. Millions)*	
		On-site	*Off-site*	*On-line*	*Off-line*	*No. of outstanding cards as at the end of the month*	*ATM*	*POS*	*ATM*	*POS*
		1	*2*	*3*	*4*	*10*	*11*	*12*	*13*	*14*
	Grand Total	109740	98073	2614584	0	867003088	660321091	267996949	2168596	374819

Source: RBI Statistics.

Table 4
Electronic Payment Systems-Representative Data (Updated as on May 9, 2017)

	RTGS		*NEFT*		*CTS**		*IMPS**	
Data for the period	*Volume*	*Value*	*Volume*	*Value*	*Volume*	*Value*	*Volume*	*Value*
Nov-16	7.9	78479.2	123	8807.8	87.1	5419.2	36.2	324.8
Dec-16	8.8	84096.5	166.3	11537.6	130	6811.9	52.8	431.9
Jan-17	9.3	77486.1	164.2	11355.1	118.5	6618.4	62.4	491.2
Feb-17	9.1	74218.8	148.2	10877.9	100.4	5993.9	59.7	482.2
Mar-17	12.5	123375.8	186.7	16294.5	119.2	8062.8	67.4	564.7
Apr 2017 Total	9.5	88512.2	143.2	12156.2	95.3	6990.6	65.1	562.1

Contd. table 4

	*NACH**		*UPI**		*USSD***		*Debit and Credit Cards at POS*&*	
Data for the period	*Volume*	*Value*	*Volume*	*Value*	*Volume (in thousand)*	*Value (in Rs. thousand)*	*Volume*	*Value*
Nov-16	152.5	606.6	0.3	0.9	7	7302.6	205.5	352.4
Dec-16	198.7	626.8	2	7	102.2	103718.4	311	522.2
Jan-17	158.7	541.4	4.2	16.6	314.3	381760.2	265.5	481.2
Feb-17	150.5	592	4.2	19	224.8	357055.2	212.3	391.5
Mar-17	182.1	829.4	6.2	23.9	211.2	337962.4	229.7	416.2
Apr 2017 Total	212.6	905.2	6.9	22	188.9	301650.5	231.1	431.4

	PPI #		*Mobile Banking*		*Total*	
Data for the period	*Volume*	*Value*	*Volume*	*Value*	*Volume*	*Value*
Nov-16	59	13.2	72.3	1244.9	671.5	94004.2
Dec-16	87.8	21.3	70.2	1365.9	957.5	104055.3
Jan-17	87.3	21	64.9	1206.7	870.4	97011.4
Feb-17	78.4	18.7	56.2	1080	763	92594.5
Mar-17	90	21.5	60.8	1499.9	893.9	149589.1
Apr 2017 Total	89.2	22.3	61	1443.8	853.1	109602.2

Source: RBI Statistics

The total volume and the value of different electronic payment system can be studied with the help of above tables which indicate data for the year 2016 and 2017. The application of IT and e-banking is becoming the order of the day with the banking system heading towards virtual banking.

Schumacher's Intermediate Technology and Small is Beautiful Approach

With the above context of technological innovations in Indian banking Schumacher's theory of technological change can be taken into consideration for the appropriate decision making with reference to implementation of technology to increase the capability of Indian banks. He developed the set of principles he called "Buddhist economics", based on the belief that individuals need good work for proper human development. He also proclaimed that "production from local resources for local needs is the most rational way of economic life." He travelled throughout many Third World countries, encouraging local governments to create self-reliant economies. Schumacher's experience led him to become a pioneer of what is now called appropriate technology: user-friendly and ecologically suitable technology applicable to the scale of the community. Appropriate technology is an ideological movement of technological choice and application that is small-scale, decentralized, labor-intensive, energy-efficient, environmentally sound, and locally autonomous. As per him it is possible to give a new direction to technological developments, a direction that shall lead it back to the real needs of man and that also means to the actual size of man. Man is small, therefore, small is beautiful. Intermediate technology is important for people and issues important for them, such as health, employment, happiness, environment etc. He was interested in "appropriateness of scale". Things are best done at the smallest appropriate scale. The application of the theoretical approach

is essential when we think of implementing technology to a great extent to remove problems and widen the future prospects of the effective use of technology for the society.

Limitations

A study makes systematic efforts to reach to the concrete conclusion by using suitable data. Certain limitation related interpretations and biasness may reduce validity of the result.

Major Finding

The growth of the innovation si banking shows that there is a vast change taking place in operations of banking which is creating problems but still we cannot forgo the future prospects of the same. The financial inclusion is a measure aspect to increase effectiveness of technology based banking for its smooth and transparent functioning. The Growth of users of internet banking is very fast. Mobile banking is focused by customers in large numbers and so the banks too have focus on the same. Compare to branch banking customer management is online, mobile is very poor. Another challenge is risk management.

Suggestions

No system or institution can hope to benchmark itself against international standards without making optimal use of technology. Measures like data aggregation, customer relationship management and financial inclusion initiatives are essential to take banking to the next level of growth. Banks may have to go for mobile banking services for a cluster of villages. Alternatively, technological institutions have to come out with low-cost, self-service solutions/ ATMs. The government and the RBI should actively support such research efforts. Here, it is worthwhile to mention that the adaptability of the Indian rural population to high-tech devices is one of the fastest in the world. A wider dissemination of information on technologies and products to the Indian banking industry by the research institutions could benefit the banking institutions. The Indian banks are subject to tremendous pressures to perform as otherwise their very survival would be at stake. Banks need to adopt a more proactive and innovative approach to compliance as far as A well defined Return on Technology investment, A visible addition to customer value, Improvement of operational efficiencies leading to customer convenience and cost savings Infrastructure modernization is the key to unlocking innovation and placing the customer at the heart of a bank's operations. Launching correct and suitable technology, avoiding complicated operations, making community aware about innovative banking technology and different avenues available, verifying the level of awareness of the customer about their knowledge of innovations in banking at the individual bank level, providing additional training programmes to employees and consumers both for smooth operation of technology in financial transactions, keeping an eye on fiscal and monetary policy and making timely decisions are certain major parts of the development of economy and profitability to the banks by implementing technology.

CONCLUSION

Significant outcomes of technological innovations in banking can help to shape up ongoing programs, Enhances core banking value, Produces facts to policy makers on problems and satisfaction level, accelerates innovation, Helps in empowerment of the society from information to insight, creates risk management process, increases customer service and satisfaction. A precise plan and implementation of suitable and useful technology can make banking and economy self-reliant.

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