Impact of Technological Disruption on Workforce Challenges of Indian Banks -Identification, Assessment & Mitigation

A REPORT SUBMITTED

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Submitted by

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Acronyms

AI- *Artificial Intelligence*

AF *- Assessment Fuzzy*

AEPS *- Aadhaar Enabled Payment System*

ATM *- Automatic Teller Machine*

BC *- Banking Correspondence*

BO *- Banking Ombudsman*

BHIM *- Bharat Interface for Money*

FINTECH *- Financial Technology*

FG *- Fuzzy Grading*

FLT *- Fuzzy Logic theory*

JAM *- Jan Dhan, Aadhaar & Mobile*

KRA *- Key Reward Area*

KYC *- Know Your Customer*

MD *- Membership Degree*

NSDC *- National Skill Development Cooperation*

PSB *- Public sector banks*

PSU *- Public Sector Units*

PMS *- Performance Management System*

POS *- Point of sales*

RF *- Risk Fuzzy*

RRB *- Regional Rural banks*

UPI *- Unified payment Interface*

USSD *- Unstructured Supplementary Service Data*

WCI *- Workforce Challenge Index*

Preface

The banking industry across the world is marked with digital revolution owing to the fast growth of technologies. The new generation of financial technology start-ups has unbundled the traditional banking model by providing a smooth customer interface[1] and innovative banking services[2]. In the pursuit of sustainable growth and to address competition, banks are embracing new technology and redefining the ways of servicing customers. The technology transformation has made a gradual shift from brick and mortar system to technology-enabled services that need less human intervention. Though positive aspects of technological innovations are evidenced, in parallel there is a need to examine whether the disruptions created by new technologies outweigh the benefits?

The emergence of new disruptive technologies has changed the competitive landscape of the banking industry. Banks embrace new technologies to bring process improvements, cost optimization and to provide value-added services. While investment in technology is inevitable, there is a need to balance between technology and human workforce. Banks need to prioritize the challenges of adopting new technologies and address the challenges of the workforce.

It is evident that the banking industry is more dependent on technology than ever before, the technology-driven transformation leads to value-added customer service, lower operating cost, and more efficient banking. The technological changes have open challenges in the area of sourcing the appropriate technology, managing the technology portfolio and partnering with other service providers. The advancement in technology and stringent banking regulation has led to increased transparency, increased competition, and pressure for assuring profitability. Banks are looking for new ways to deliver value to clients and create a new competitive edge. The industry is bound to strike a balance between adopting technology and making the system adapt to the change in the technological environment.

The workforce is a backbone of any business growth. While human invent technology for the betterment of work, excessive use of superior technology would lead to a war between technologies vs. humanity. Banks are exposed to the dichotomy of balancing technology adoption vs. Workforce management. Therefore, identifying various challenges of the workforce due to technical disruptions is an essential area of concern. In this backdrop, the

[1] customers are embracing mobile and digital technologies for banking at one touch
[2] ranging from money transfers, loans, mobile wallets etc

present study aims to address the challenges of technological disruptions. How technology disruption affects workforce of Indian banking business? What is the impact of disruptions on banking employees? What could be the feasible mitigation measures to reduce workforce challenges? In this backdrop, the central argument of the report revolves around identification, assessment, and mitigation of workforce challenges.

Acknowledgment

It gives us immense pleasure to express our heartfelt gratitude to all of them who have inspired, encouraged, and helped us in bringing out this research report successfully. We have special gratitude to Dr. J.N. Mishra, Chief Executive Officer, IIBF, and the Research Advisory Committee who have been instrumental in the successful implementation of the macro research program of IIBF that has received laurels for building a contemporary body of research-based knowledge and literature on banking and finance issues.

We owe our sincere gratitude to our Institution NMIMS- Bangalore & Symbiosis- Bangalore, faculty members and other colleagues for the encouragement and support in the successful completion of this research study. Our special mentions of gratitude are due to the Director Dr. Vinay Apparaju and Dr. Rajesh Panda for their encouragement and guidance. Our association with them in our capacity has always been a source of motivation and inspiration for us. We acknowledge with sincere thanks to the support and cooperation of various bankers, bank managers, senior officials, retired bankers whom we met during this research project and to all those who provided useful insights and inputs for enriching this study.

We would also like to thank our respondents who help us in filling questionnaire through Linked-in and other social networking platforms where most of them without knowing much about us help us in sharing their views on our topic even shared qualitative suggestions also through social networking websites. We would like to thanks our faculty colleagues who helped us for editing and proofreading of document.

We will never forget the sacrifices, forbearance, and unending support of beloved Parents, spouse and other family members whose advice have been a perennial source of motivation and encouragement in life, for their constant support tangible and intangible both, forbearance and their sacrifices during this research project.

Finally, we take this opportunity to thank one and all who have helped us directly or indirectly in completing this research project.

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T Viswanathan

Abstract

The banking industry has been going through a rapid transformation due to progressive economic reforms, changing demographics and fast-paced technological developments. The industry has been one of the major recruiters, and it is expected to generate more than 20 lakh job opportunities in the next 5-10 years. At the outset, the influence of technology in banking has the potential to reduce human intervention and to make most of the jobs redundant. Adoption of new technology also creates a change in process, delivery channels, training, and development. Moreover, banks need to have a trade-off between technology and human interface. Therefore, managing technology disruptive workforce challenges are of foremost concern to the banks. The scope of the study encompasses comprehensive challenges in general and significant workforce challenges of banks in particular.

In India, the banks have been facing multitudinous challenges such as regulatory risks, up gradation of technology, intense competition, and operational risk. The recent development in technology has exposed the bank workforce to surmount many challenges. Workforce challenge plays a vital role among other challenges. The extant literature review shows several studies have identified various workforce challenges of banks. However, the impact of the same has not been empirically evidenced using appropriate tools. Such studies are more observatory than investigational.

The present study focuses on identifying the significant workforce challenges of banks due to technological disruption through a structured approach that includes literature review, focus group discussion, assimilation of consultancy reports and conducting perception survey. This study essentially identifies the workforce challenges of commercial banks, its impact and proposes a framework for mitigation. The scope of the current study is limited to Indian public and private sector banks.

The framework of research methodology includes the process of identifying challenging factors, a framework for questionnaire design, tools for analysis and outcomes. The data for the study has been gathered from both primary and secondary sources. The secondary data is

gathered from the exhaustive literature review, and primary data is collected using focus group interview and structured questionnaire.

As per the extant literature survey, some of the technology disrupted workforce challenges identified are Recruitment planning, Career plan, Training exposure, Skill gaps, Skill deficiency and so on. The assessment of workforce challenging risk factors are done using Fuzzy logic approach, and finally, a conceptual model is presented for mitigation of significant challenges.

The challenges were mostly subjective and were quantified using an advanced fuzzy logic approach. The study reveals that Indian banks face moderately high zone of challenges due to technical disruptions and it is simultaneously approaching towards high zone which needs to be resolved on priority.

The study proposes an index that quantifies the workforce challenges of banks. The findings of the study will address all the research questions concerning the identification of workforce challenges, its assessment, and mitigation. Mitigation measures are suggested to address the challenging factors of the banking business. Prominent mitigation measures are on the job training; retired officials support to groom workforce, competency mapping, skill-based allowances, etc.

The outcome of the research would facilitate the banking industry to come out appropriate policies to address the challenges. This study aims to provide a framework for the banking sector so that they can get a better overview of their existing bank situation and overcome workforce challenges accordingly.

Keywords: Indian Banking System, Technological Disruption, Workforce Risks, Workforce Challenges Assessment, Fuzzy Logic Approach, Challenge Mitigation

CHAPTER 1

Introduction

1.1 Background of the study

Indian banking industry is expected to witness better growth prospects due to favorable economic reforms and increasing demand for banking and financial services. The banks in India are facing multitudinous changes in regulatory reforms, policy initiatives, and technology evolution. These progressive changes have created a metamorphosis in the existing banking business. Few notable examples of recently implemented reforms in Indian banks such as Jan Dhan Yojana (Banking for all), payment banks, digital wallets, direct benefit subsidy schemes, etc. have triggered the rapid expansion of banks and created opportunities for entry of new players into the sector. The financial inclusion and new banking license have created more job opportunities in the banking sector. The industry has been one of the largest recruiters, and it is expected to generate more than 20 lakh jobs in the next 5-10 years (Randstad, 2014).

The Indian banking system will grow in leaps and bound in size due to diversification in the light of the present economic situation and its increased industrial financing requirements, Siraj and Pillai (2013). The gross value addition from banking industry has increased from 480,232 crores in 2011-12 to 587945 crore in 2014-15. (Figure 1.1). There is a significant relationship between economic growth rate and bank credit[3]. (Figure 1.2)

[3] Though there are various parameters which govern economic growth among all the relationship between bank credit and economic growth is one of the most discussed issues among the academicians and practitioners. In general, bank credit plays a pivotal role in economic growth, because bank credit may stimulate the capital accumulation and rate of saving that further induce the economic growth{Formatting Citation}

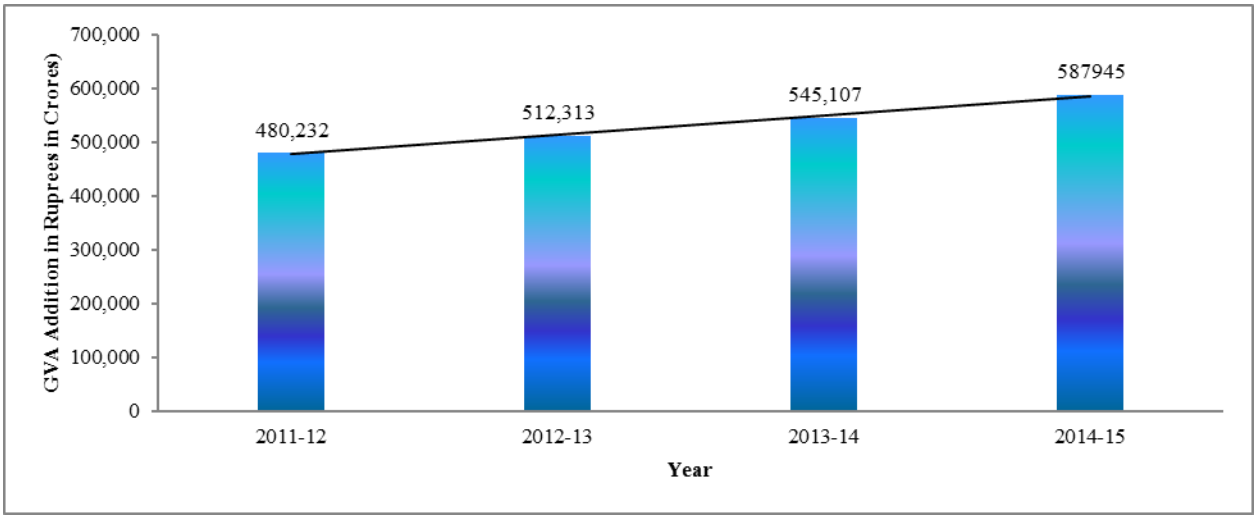

FIGURE 1.1: GROSS VALUE ADDITION IN FINANCIAL SERVICES (SOURCE: RESERVE BANK OF INDIA)

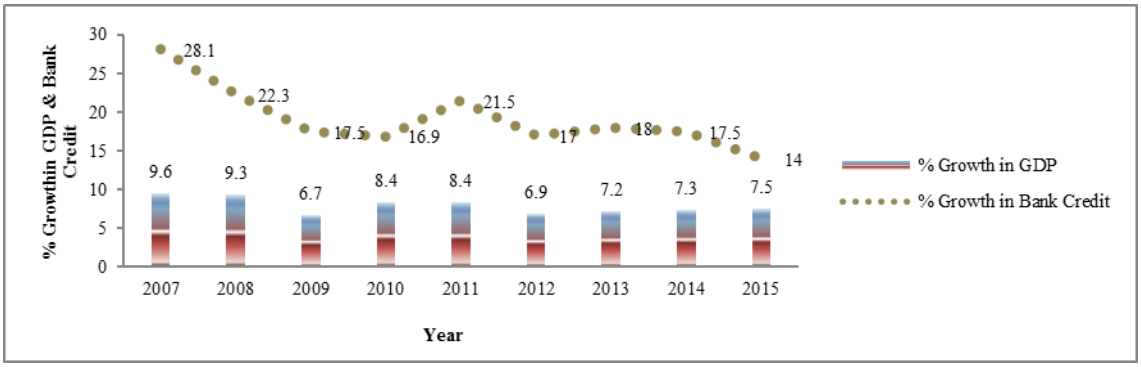

FIGURE 1.2: BANKING SECTOR GDP GROWTH AND BANK CREDIT GROWTH (SOURCE: RESERVE BANK OF INDIA)

Emerging trends in banks today have the onus of being proactive in technology, via making the services available to customers anytime and anywhere. Banking technology has been emerging as synonymous with the concept of everyday banking. Among all growing economies for technological development in the banking business, Indian economy is best suited because it is strident and more volatile. The visions like Digital India, leveraging Jan Dhan, Aadhaar and Mobile (JAM trinity) and other financial services have created the need for interoperability between data, mediums, identity systems, and bank accounts.

Banks have been competing so far with their peers and competitors. The advent of technology has created a new competitive arena where banks have to compete with the financial technology firms. Public and private sector banks have adopted new technologies to become competitive by offering value-added services to the customers. The momentum of technology change is much faster than the speed at which banks could adopt and implement new technologies. The rapid growth in technology has changed the very fundamentals of the banking business. The emergence of new fintech start-ups have brought innovation in the payment systems, borrowing & lending and customer relationship management. As a result, banks in India need to decide

on technology adoption, designing and managing the technology portfolio and the measures to address the challenges of technology disruption.

The increased size of the banking business generates complexity in managing banking processes, practices, services, and workforce management. The economic reforms and liberal banking policies have created intense competitive pressure among the banks. Several studies have addressed challenges faced by Indian banking system over the period. Few prominent challenges which are faced by Indian banks are concerning declining asset quality of public sector banks, capital adequacy, high transaction cost, technology up gradation which creates disruptions, asset liability management, and workforce challenges (Kaur, 2012); (Henry, 2014); (Zhang, 2012);

Many examples can be referred were the economic reform initiatives undertaken by the government has created a complete metamorphosis for Indian banks. All such developments brought in a major change in the operating environment of the banks (Kumar, Mohan, Singh, 2012).

Dynamic technological environment and increasing number of new banks being set up in Tier 2, 3 and other cities, have shown growing demand for business correspondence, sales executives and other banking professionals to reach out to the rural population. While there are ample growth opportunities, the sector is expected to face significant workforce challenges under technological up-gradation. Public sector banks will be undergoing massive retirement of workforce ranging up to 50 % in the next few years. Hence hiring, training, induction, addressing the age gap, performance appraisal and other human-related aspects need particular attention. Therefore, to cover this transition stage and managing technology disruptive workforce challenges is of utmost concern to the banks.

The workforce is a backbone of any business growth, so identifying various challenges which bank employees face due to technical disruptions is an area of concern. In the backdrop, the study aim to seek an answer to various questions. What is the effect of technology disruption on Indian banking business? Is the Indian banking business affected by technological disruptions? What is the impact of technical disruption on banking employees? What are the feasible mitigation measures to reduce workforce challenges? The Central argument of the report revolves around identification, assessment and further mitigation of workforce challenges.

1.2 Evolution of Indian Banking System

Indian Banking system has conceded through three different phases, i.e., phase 1, 2& 3. The early phase 1 which started in 1786 remained till 1969. The evolution of Indian banking system has started with the formation of Bank of India, Bank of Bengal, Bank of Bombay and other changes are highlighted in figure 1.3. Development of banking system was the primary criterion of the first phase.

The second phase of banking evolution spreads between 1969 and 1991. This phase has seen a significant change in the scope of banking services. Fourteen banks were nationalized in the year 1969, and another six more banks were nationalized in the year 1980. The banking sector was exposed to transition in policy reforms, rules, and regulations. Another noteworthy milestone during this phase was the creation of Credit Guarantee Corporation, Insurance to bank deposits also incepted in the same phase. The golden era when Reserve bank of India the banker's bank has issued a license to set up Regional rural banks so that the reach of banking services to rural India can be extended. The third phase started after 1991 had transformed the traditional banking services to more technology enabled and customer friendly services. In this phase, banks had introduced ATM services, mobile banking, and electronic banking services.

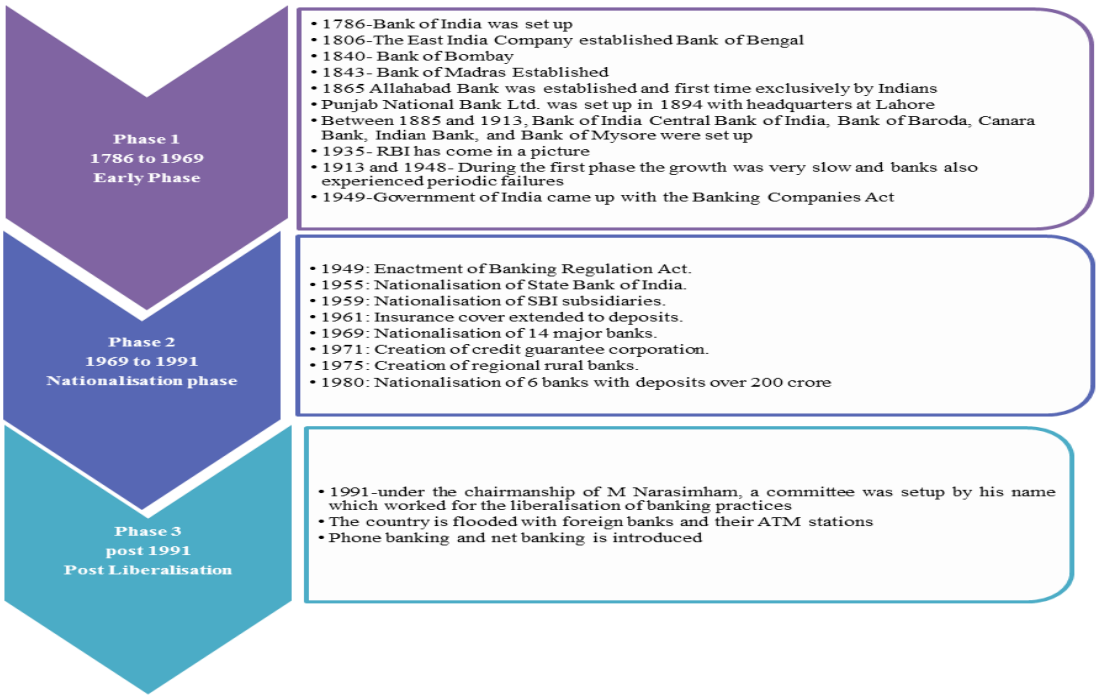

Figure 1.3: Evolution in Indian Banking System ***Source: Reserve bank of India (RBI)***

The influence of technology in banking was started early in 1980's with the use of ledger posting machine. Since then the industry has been one of the primary users of technology in all facets of the business. The continuous use of technology in the initial stage has progressed into the technology revolution in the last couple of years. Indian banks leapfrogged into the era of digital revolution and it is moving towards virtual banking. The future of banking is marked by the emergence of new technologies posing a significant threat, both to the banking business and the workforce of the bank. The banks are going to face the threat from financial technology firms that are likely to take a specific place in the banking business. Banks need to embrace new technologies not only to compete with its peers but also with other financial service providers. Such a move is possible only if the banks continuously update the employee skills and address the workforce challenges that arise due to disruptive technologies. The research aims to analyze various technological disruptions and its impact on the workforce challenges of Indian banks.

1.3 Major Landmarks Banking Technology and Transformation in India

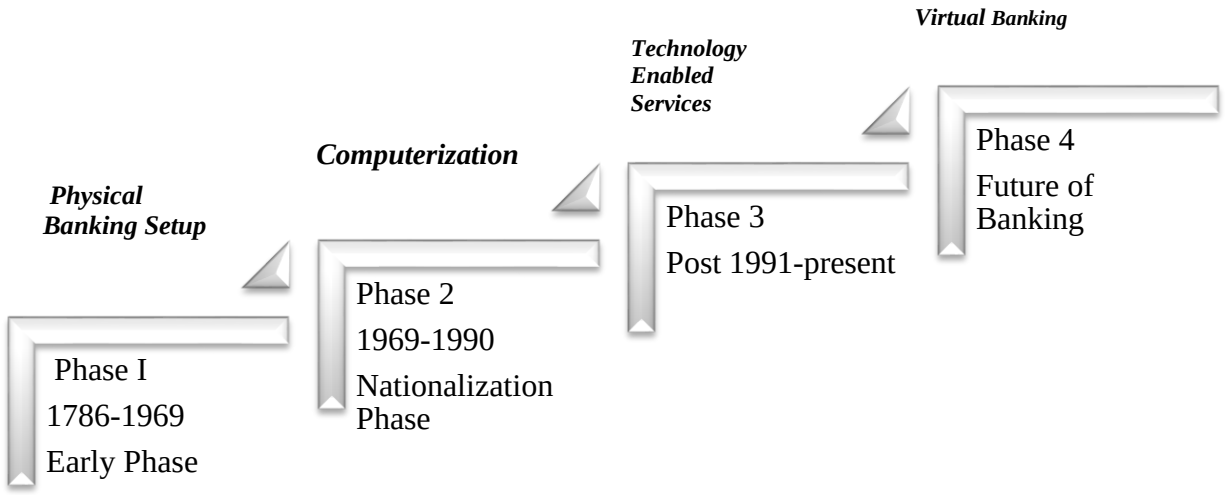

FIGURE 1.4: TECHNOLOGY EVOLUTION AND BANKING UP GRADATION

Indian Banking Industry is in the midst of the technology revolution, where the financial reforms that were initiated in the early 90's and the globalization and liberation measures brought a new operating environment to the banks which include services such as anywhere banking, telebanking, E-banking, Internet banking, web- banking and ATMs. The banks in India have upgraded their capability to handle business volume by implementing technology-

driven transaction systems. The banks are trying hard to meet the upcoming demands of the customers by offering innovative and attractive packaged technology-based services. It is estimated that by 2020 the average age in India will be 29 years, and this young consumer base is internet savvy and wants real-time online information. Indian banks, therefore, need to aspire high and move toward implementing a world-class internet banking capability.

Banks can maximize their profits as a result of two fundamental changes in the way they do business. Some have abandoned their marginal operations and focused on their core businesses whereas others have maximized processing scale through an intense round of acquisitions and consolidations. Despite apparent prosperity, banking leaders are facing their most challenging time since the advent of financial technologies. The role of banks in providing appropriate financial channels and services for businesses and consumers is in the midst of nothing less than a fundamental transformation.

The financial world had changed forever when the telegraph gave the banking industry its first technological breakthrough. This leap brought about the close coordination of branch networks, enabling banks to deliver superior customer value at a lower cost. Payments suddenly took days to deliver, instead of weeks; daily branch reports gave customers access to far-flung market information, and economies of scale allowed branch banks to offer higher interest rates and lower fees. As a result, the world witnessed the birth of the modern commercial bank.

However, all those advances pale when compared with today's changes in information and computing technology. These newest developments everything from the Internet and intelligent agents to enhanced communications and sophisticated analytics is just a breed apart. They are relatively inexpensive, non-proprietary and, most important, available to ever-growing segments of the population. Moreover, their impact on the existing banking order is just beginning to be felt.

Indian banks have been deploying technology-intensive solutions to increase revenue, enhance customer experience, optimize cost structure and manage enterprise risk. However, there are variations in the technology agenda and implementation capability across different players of the banking industry. Enhancing core banking value, revamping the digital agenda, moving from information to insight, dealing with a changing risk regime, from cash to electronic modes of payment, grappling with financial inclusion, empowering employees and accelerating innovation.

The age of digitization and move towards the adoption of new technology have transformed the way banks do business today. Information Technology has played a vital role in shaping India's banking scenario. Banking technology is directly influenced by the spread of smartphones and the wide availability of 3G and 4G networks. Advances in technology have also created newer customer expectations, multi-channel structure, and progressive product offerings in the banking industry. Banking technology has been emerging as synonymous with the concept of everyday banking. This becomes a credible reality only when there is complete digitization of banking operations, as well as a robust ecosystem of cross-industry partners and providers. Here are the anticipated trends that are likely to take the Indian banking industry by storm in the future.

1. Diligent Multichannel Network: Exploring and uncovering multiple channels of communication to customers and other banking partners will be critical for banking industry growth in the near future. Banks should invest wisely to understand customer analytics, as this can help derive efficient channels to engage with customers.

2. Proactive Social Engagement: Engaging with customers on social media platforms and other social networks foster customer trust and confidence. One of the most critical needs in banking technology for the future – social media engagement allows customers to regard the bank as a go-to source anytime.

3. Re-engineered Workforce: Synchronizing the advantages of technology with the skills and capabilities of the workforce is a significant attempt to maximize operational efficiency and workplace safety.

4. Smart Banking: Smart banking involves tapping software intelligence at every stage of banking, from decision-making to exploring innovative opportunities. Proactive deployment of relevant banking technology is critical.

5. Tapping the Potential of the Internet: In 2013, India's online user base crossed 200 million, and after that, it has been growing by leaps and bounds. Online users and banking customers have moved from desktop to handheld gadgets, thereby increasing the need for responsive websites and mobile friendly banking elements.

Banks are expected to make a clear customer-centric proposition and define capabilities that include digital innovation, a vision for the future, appropriate investment choices, and scalability to work towards the goal.

1.4 Changing dynamics and its effect on Workforce of Indian Banks

Last five decades has seen increasing employee intake in the Indian banking system, The success of the bank depends on employee satisfaction, who is one of the prominent main

stakeholders(Agrawal et al., 2003). Workforce challenges need to be adequately addressed because any issues will create a loss for the Indian banking system.

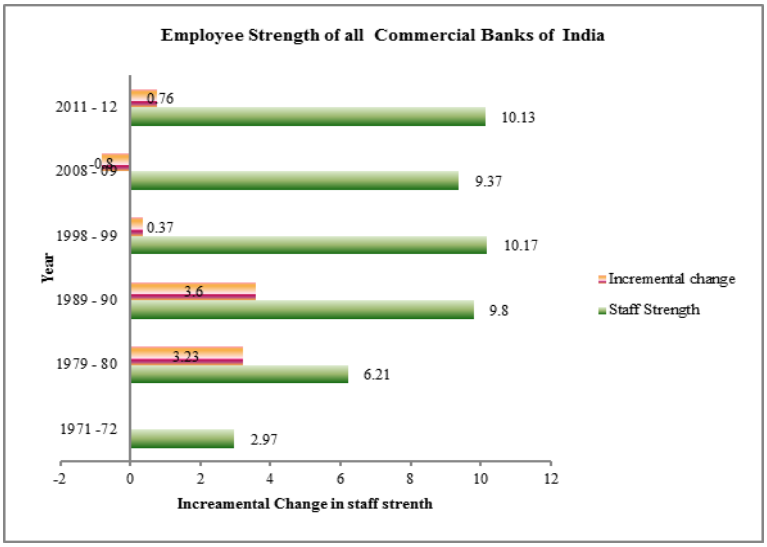

FIGURE 1.5: EMPLOYMENT STRENGTH IN INDIAN BANKS

Source: Reserve bank of India (RBI)

Figure 1.4 shows the incremental employee strength of commercial banks for the last five decades. The incremental change had increased from 2.97% in 1971-72 to 10.13% in 2011-12. The employee's strength has been increasing at a CAGR of 2.5% since 1971, At this growth rate, the banking sector that has employed 10.13million employees is expected to induct 11.5 million and 13 million in next five and ten years respectively, (RBI. 2017). Hence, workforce management is one of the critical success factors for the banking sector and turbulence to this domain should be anticipated in advance. This increased headcount has created a curiosity to explore this area further.

STAFF HEADCOUNT: PUBLIC & PRIVATE BANKS

	MARCH 2005	MARCH 2014	EMPLOYEES ADDED*
Public sector banks	748,805	830,250	81,445
Private banks	92,419	296,115	203,696
Foreign banks	17,336	24,834	7,498
All commercial banks	858,560	1,151,199	292,639

*Additions over the nine-year period — Source: Reserve Bank of India

FIGURE 1.6: STAFF HEADCOUNT IN INDIAN COMMERCIAL BANKS TILL DATE

1.5 Need for Study

Technological development always comes with both positive and negative impact on business. However, absorbing these technological changes are mandatory sometimes, because banks have to survive under competitive pressure. Adoption of new technologies such as blockchain, artificial intelligence, cybersecurity helps to manage the business process and facilitate business development. At the outset, it also creates challenges in other areas like strategic, financial, operational and workforce. Managing a workforce is the fundamental requirement for any organization to handle other functional challenges successfully. Solving any critical problem requires human intervention. The most prominent problem faced by banks is an issue of technology and human interface. Banks need to find ways to effectively balance the two in order to leverage the benefits of technology. Therefore there arises a need to identify various human-related challenges, create a framework to quantify those challenges and suggest appropriate mitigation measures.

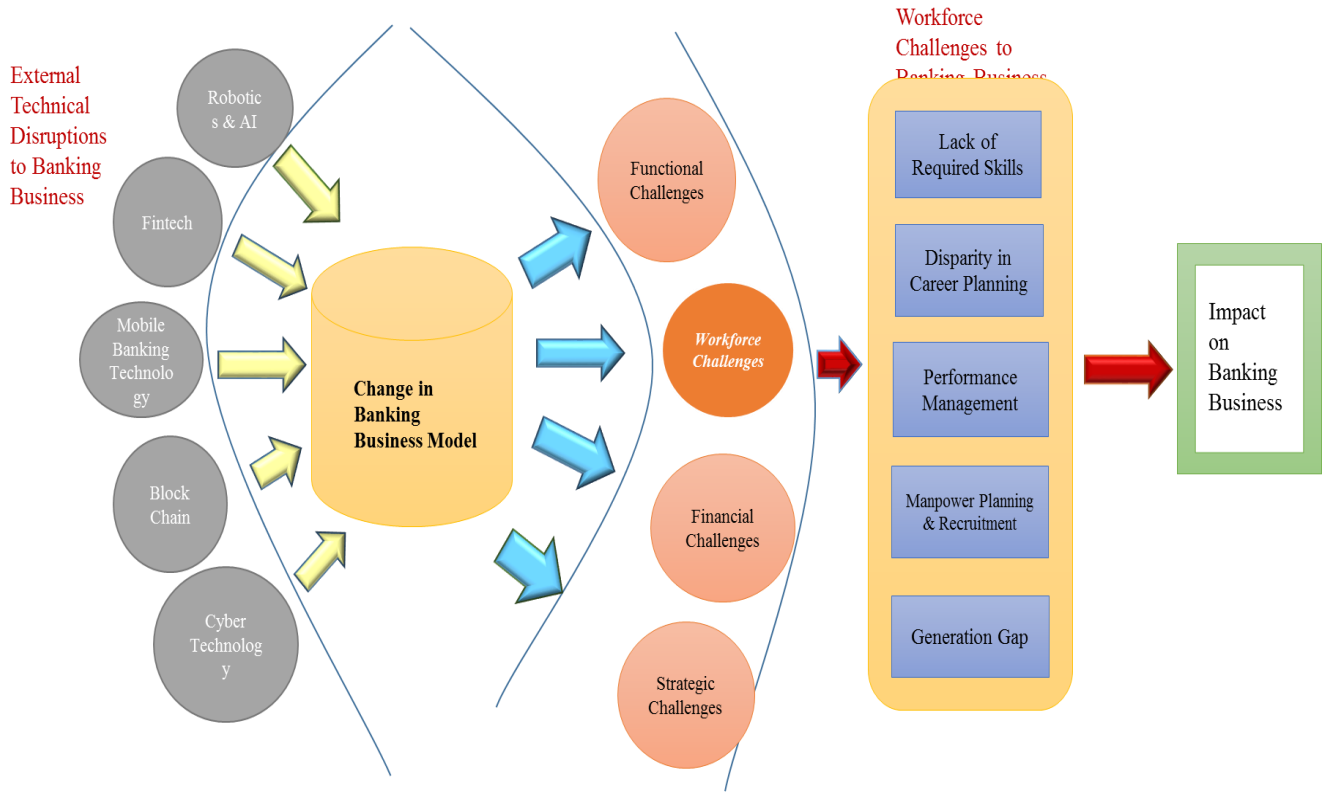

FIGURE 1.7: NEED FOR STUDY BETWEEN THE SYMBIOTIC RELATIONSHIP BETWEEN BANKING AND TECHNOLOGY

1.6 Focus of Study

There are two kinds of banking licences that are granted by the Reserve bank of India – Universal bank licence and differentiated bank licence. Unlike Universal banking, differentiated banks (niche banks) are banks that serve the needs of a certain demographic segment of the population. Small finance banks and Payment banks are examples of differentiated banks in India. Custodian banks and Wholesale and long-term finance banks (WLTF) are newly proposed differentiated banks. Small finance banks are niche banks that focus and serve the needs of a certain demographic segment of the population. The objectives of setting up of payments banks will be to further financial inclusion by providing (1) small savings accounts (2) payments/remittance services to migrant labour workforce, low-income households, small businesses, other un-organised sector entities and other users.

Indian banking system under universal licence can be defined as commercial based on their nature of operations. The Commercial banks are further classified into public and private sector banks. The banking sector is one of the largest recruiters with employee strength of about 11.2 million during 2016-17. Among the three categories of banks, commercial banks employ a significant workforce, ranging up to 60-70%. (RBI, 2018)

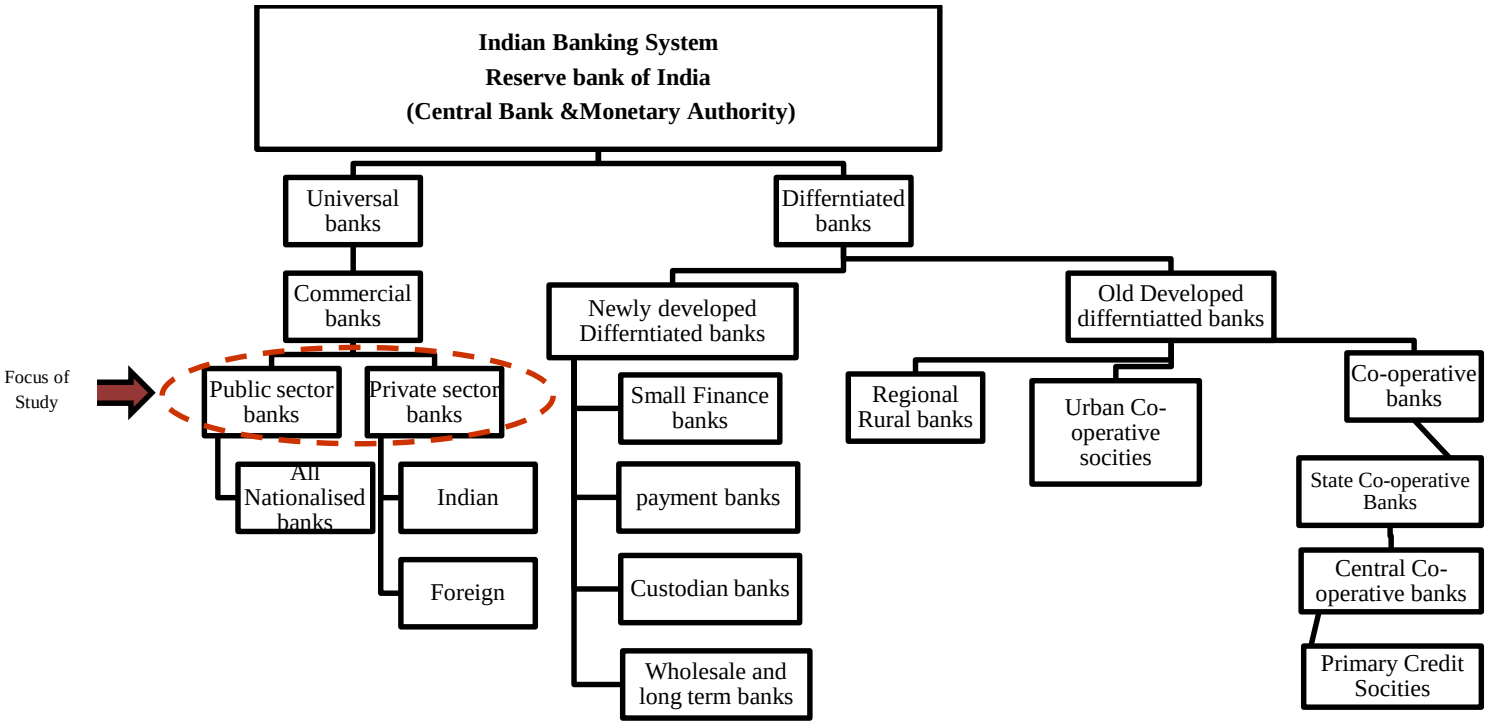

FIGURE 1.8: STRUCTURE OF INDIAN BANKING BUSINESS IN INDIA

The public and private sector banks are exposed to the daunting task of managing the workforce. Increasing staff strength triggers significant reforms in human resource policies

especially workforce challenge management. The banks need to identify the critical factors which are of technology disruptions and further its assessment during the Technological transition phase, followed by an appropriate plan of action for mitigation. This research intends to identify significant challenges of the workforce during technological upgradation and proposes a structured model for mitigation. Both public and private sector banks are considered for the study.

1.7 Chapter Summary

This chapter highlights the history and growth of the Indian banking sector. It gives the theoretical background of various challenges faced by banks in the past. The banking industry has been one of the largest recruiters since decades. At present, the industry is going through significant changes due to changes in the external environment. The future of banking will be driven by technology.

CHAPTER 2.0

LITERATURE REVIEW

The literature review explores the issues and challenges related to technology disruptions, technology-driven workforces challenges, and identification, taxonomy, assessment, and mitigation measures adopted by the banking business to address workforce challenges. Five dominant themes were considered for framing research questions raised in this report. The literature draws attention to the existing academic literature on workforce challenges assessment and mitigation models.

Studies such as (The U.S.Department of Labor, 2007); (Ernst &Young, 2011) revealed the impact of technology on the workforce. The study emphasizes that apart from other critical challenges such as banking business growth, competition, etc, the work environment of bank employees is one of the most critical challenges. (Ciutiene and Railaite, 2015); (Williams, 2013); (Moschetto, 2014) identified and analyzed various factors of challenges in sectors like investment banks, IT industry and BFSI. Globally, a significant amount of research has been done concerning identification of workforce challenges in various areas such as banking and finance sector, manufacturing industries, and insurance companies. The literature review of this report is presented to show research gaps and research questions.

2.1 Global practice of Workforce challenges due to technological disruptions

Research studies on measuring the effect of technology on various business vertical are still in its primitive stage. Banks are emphasizing the usage and advancement of technological applications in all areas. This study aims to focus on quantifying the effect of challenges faced by banks.

(Dangolani, S. 2011), in his study on Iran banks shows an impact of IT on every aspect of human life and business. Though the author has emphasized the use of technology, the adverse effects of technology have not been covered. The study aims to investigate the effect of technology in the banking system of Keshavarzi Iran. The findings of the study indicate that technology contributes to the banking system in three different ways as follows: saves the time of the customers and the employees, it cuts down the expenses and facilitates the network transactions but also affects the banking workforce.

A study on middle east banking business indicates that technology and banking are inseparable in UAE. The transformation from brick and mortar banking to technology-driven banks had progressed during the last two decades. Economic liberalization and the integration with international best practices in banking and finance gave the much-needed push to a mostly stagnating computerization program.

Ernst & Young report of 2016 has revealed that by 2025, millennial or Generation Y, will make up 72% of the global workforce. This generation brings new interests and priorities. Millennials are more digitally capable, diverse and dynamic than previous generations.

Technology advancement in banking is evidenced by the literature review. The banking business has started using advanced technologies that include robotic technology and artificial intelligence. The use of technology is expected to make a few jobs redundant. It is essential that organizations establish a working group, including human resources personnel and technologists, to map functions across the organization against the steps in each process to identify targets for automation.

2.2 Technological Disruptions and Role of Indian Banks

A study conducted in Nigeria shows that there are interrelationships among labor unions, employees, and employers in commercial banks. The study attempted to find out the causes and consequences of staff retrenchment in the banking sector and also to identify the various employment laws, statuses and central regulatory agencies. It is expected that 25 – 31% of business service jobs in the banking industry will face the risk of automation in the next 20 years, where repetitive and highly structured jobs are expected to decline. (Dangolani, S. 2011)

Arundhati Bhattacharya (2016) has highlighted that Indian banks are not able to match current standards of global market and trying to retain employees is another challenge due to fewer perks and less adaptability of employees towards new technical innovations such as cyber security, artificial intelligence.[4]

The major banks, meanwhile, have been streamlining their operations to try and position themselves to compete with new challenger banks. Rafts of redundancies have been seen at the

[4] https://www.thehindubusinessline.com/money-and-banking/missing-middle-hr-challenge-plagues-public-sector-banks/article7575757.ece

major high street banks, with each investing in ever greater digital capabilities to serve customers with the minimum of human interaction.

The consulting industry is at the forefront of these changes, working with both new entrants and the high street banks to bring the industry up to speed. There are some big questions to be answered at a societal level though. Are we happy with an evolution of the sector in a way that decimates traditional middle-class jobs? What's the right balance between regulation and allowing our banking leaders to innovate? Imagine if an Amazon of the banking world were to emerge, winning customers on a global scale but with none of the infrastructure or satisfaction of headcount of our traditional banks then situattion is really a severe matter of concern, and which need to concentrate.

2.3 Identification of Workforce Challenges by Banks

"Healthy financial institutions are indispensable to any productive sector and economy. Events over the past few years have brought unprecedented change to the landscape of the financial sector," said Mike Van Handel, Manpower Group Chief Financial Officer. "As we have seen, strong economies rely heavily on the vitality of their economic institutions."[5]

The human resource linked challenges have been addressed by (Higginbothem, K, 2015); where she emphasized that in banking business HR directors believe that HR challenges come under the categories of regulation, remuneration, and restoration.[6]

Arundhati Bhattacharya (2016) has highlighted that Indian banks especially SBI is not able to match with current salary standards of the market so sometimes SBI hire employees on the very significant position on contractual positions and trying to retain employees is another challenge due to fewer perks.[7]

The use of technology has brought a revolution in the working style of the banks. In this study, the author attempted to identify the general sentiments, challenges, and opportunities for the Indian Banking Industry. This article concludes that primary emphasis is required on the Indian

[5]http://www.manpowergroup.com/wps/wcm/connect/012f50c7-5530-4839-a4ed-c9e4ea28e760/SWC_Why%2BFinancial%2BInstitutions%2BNeed%2Ba%2BWorkforce%2BStrategy_10.18.13.pdf?MOD=AJPERES&CACHEID=012f50c7-5530-4839-a4ed-c9e4ea28e760

[6] https://www.forbes.com/sites/karenhigginbottom/2015/01/21/hr-challenges-facing-the-banking-sector-in-2015/#2edbe2f64db6

[7] https://www.thehindubusinessline.com/money-and-banking/missing-middle-hr-challenge-plagues-public-sector-banks/article7575757.ece

banking product and marketing strategies to get a sustainable competitive edge over the intense competition from national and global banks. (Singh, A., 2012)

The literature review examines the challenges of the Indian banking system and issues about the workforce. Dynamism in Indian banking can be attributed to challenges such as the upward direction of interest rates, demanding customers, financial inclusion, technological advancements, competition for human talent and efficient-utilization of a bank's resources.[10]

A study on Indian banking HRD system showed a dearth of comprehensive understanding of challenges that hit various aspects of Indian banking, (chakraborty, K, 2009). This report ascertains various challenges faced by the Indian banking industry and recommends changes to be made concerning human resource development. In an environment that calls for strategic changes, implications can be drawn for studies addressing issues like investment in HR, reaction to changes in HR practices and feasible solutions to manage change.

A study on human resource issues in banks emphasize the need for banks to be multi-faceted, like an assessment of skill requirement, identifying and bridging the gaps, identifying the talent, putting the available talent to the optimum pool, attracting fresh talent, retention of talent and change management.[3]

SBI Chairperson Arundhati Bhattacharya mentioned the difficulties in giving market-related salaries. The bank is trying to hire people at the lower levels directly from campuses and on contract. This obviates their ability to have a career with the bank and therefore may not be that attractive. (Murray, P. & Kline, J (2015)

The most severe problem that is affecting the Indian public sector banks is that of age and experience profile: The banks were sluggish in the recruitment process over a period. Majority of the recruitment was in the Sub-staff cadre. With limited direct recruitment in the Direct Officer cadre, the majority of the junior management posts were filled up by promotion from clerical personnel. During the period 1992-97, the growth rate of employment was less than 1 percent. (Ganoulis , 2011)

Indian Banks face several HR challenges like implementation issues in new technology, long process in the decision, Seniority based promotion, limited performance incentives, inadequate compensation policies, and skill deficiency. (Singh, A., 2012)

Several studies emphasized identification of workforce challenges which is an outcome of the working environment uncertainty towards employees.

2.4 Practices for Workforce Challenges Assessment

The current practices of workforce challenge assessment are mostly qualitative. Assessment is a systematic approach to collect information about the customer's strengths and assets, needs and challenges, interests and goals. This information, in turn, guides the development of the customer's employment plan and all other management activities. Few studies have used judgmental subjective approach such as brainstorming, opinion method or Delphi method to asses workforce challenge assessment,(Mannar,2010); (Singh, A., 2012) . Though a primitive level empirical work such as principal component analysis, scenario planning has been observed in few global studies but , all those studies missed on respondent biasedness in results which is severe shortcoming of this method since most of the identified workforce challenges are qualitative in nature. (Ernst & Young, 2014); (Roy, N. et al., 2014).

In this current study the assessment of challenges is computed using fuzzy logic approach which is a strategic way to evaluate results and reduces errors. Most of the stochastic approaches such as real time simulators, sensitivity analysis deals with empirical data but ignores the qualitative fact linked with challenge and also ignores responded biasedness. In this report respondent biasness is considered for assessment of index and author's received less erroneous results. Author's prominent orientation before this study was to create a framework which address the challenges systematically and assess it with less error.

2.5 Workforce Challenge Mitigation Models- Global Practices

Indian banking system is highly regulated with the presence of a healthy body which governs the entire banking business RBI. A highly research oriented organisation which believes in policies, modifications and up gradation based on situation requirement. Despite the presence of such robust banking structure the emerging challenge which is increasing exponentially and spreading their fins are still not monitored appropriately within Indian banking system. The reason for less exploitation of this area is not because of less work done in area but due to less awareness among stakeholders about challenges and their mitigations.

If globally workforce mitigation practices are observed it was found that investment banking business which is highly upgraded and adopting technology is very fast in adopting new practices whereas commercial banking business is not that vigilant. The advent of technology

so far considered as development for banking business whereas the disruptive face is now started coming up in banking business. (Hari Narayana et al., 2006)

Several studies have been performed from time to time globally which addresses the workforce challenge mitigation measures as (Roy, N. et al., 2013). In these studies authors have emphasized on several mitigation measures as training the employees from time to time, hiring employees on a contractual basis for niche job profiles.

In a study of Nigeria and Iran banking system authors have highlighted emphases on the job training and better compensation or remuneration works well when it comes to retain or motivate an employee for being stick to the job profile.(Moschetto, M, 2013)

In Indian banking system through practices are suggested for mitigation workforce challenges those practices are not linked to advice challenges arises due to technology disruptions that is why it is the need of an hour to investigate this area on an urgent basis and find out a solution for on urgency.

2.6 Summary of Literature

Few studies based on workforce challenges identification are undertaken in India. (Ciutiene & Railaite, 2015); (Ernst & Young, 2015); (Williams, 2013). (D. Sampath, 2014); (Manikyam, 2014). Authors have identified various challenges, but this area still demands to explore.

To identify Workforce challenges, their impact and severity so far minimal studies has been performed in India which highlights classification based workforce challenges identification and assessment (Moschetto, 2014). Many workforce challenges have been identified in the Indian banking system such as aging, technology, performance appraisal., some of which have been addressed by (Murray, P. & Kline, J (2015) and (Moschetto, 2014).

Workforce challenges identification and assessment are two faces of the same coin. Challenge identification plays a vital role for assessment (Gajewska & Ropel, 2011). The primary purpose behind workforce challenge analysis is to check the impact and severity of identified challenges on associated stakeholders such as employees, shareholders, public, government, and markets(Kalantzopoulos, Hatzigeorgiou, &Spyridis, 2008).

The workforce challenges assessment process was performed by authors at various capacities and with various purposes. The workforce challenges assessment isperformed using tools and

techniques qualitative practices i.e brainstorming, discussion based approach or in few cases empitical analysis like principal component analysis (Jenab & Ahi, 2010); (Tongtao & Cunbin, 2014). India is still lacking in assessing workforce challenges in the Indian Banking system correctly, due to the presence of more qualitative factors which are avoided in assessment leads to erronious results or outcomes. Workforce challenge assessment should be done correctly so that firstly it covers all quantitative and qualitative factors and Secondly, the best assessment practices should show less deviation in the expected result from the actual one, and the real picture of situattion should be portrayed in front of policymakers and risk mitigators (Parandin, Seidzadeh, & Hamedi, 2013).

An accurate analysis of challenges will provide suggestive measures for their mitigation. The possibility of workforce challenges, their impacts, and severity change in the region, but a proper workforce challenge assessment is always useful to facilitate employees. Employees will be benefitted with proper workforce challenges identification and subsequently their assessment and mitigation. So far the literature review on workforce challenges management in the context of Indian banking system envision that workforce management could be better and more towards application-oriented somewhat conceptual. This study will put new light for workforce challenges management of Indian banking system, to fill the gap prevailing in current studies.

TABLE 2.1: SUMMARY OF LITERATURE REVIEW

S.no	Authors-Year	Theme	Context	Inference	Gap Identified
1	(Manikyam , 2014); (Ahmed , 2009); (Kamath et al. , 2003); (Ahmed , 2009); (Kawad and Patidar , 2014); (Kumar, Mohan, Singh , 2012)	Challenges in Indian Banking System	Global/Indian	Different banks issues such as policy deregulation, Technology Dependence, Risks were studied as causative factors affecting Indian Banking system.	In Indian Banking system, Technological Upgradation workforce challenges are yet to be identified, assessed and mitigated methodically.
2	(Ciutiene and Railaite, 2015); (Henry , 2014); (Agrawala et al. , 2003)	Technology Disruptive Workforce challenge identification in Indian	Global/Indian	Many workforces challenges addressed so far globally in the banking system were identified primarily as technology, operational, workforce.	In the global scenario, though the workforce challenges have been identified, the workforce challenges about India public and private sector

		Banking system			banks due to technological upgradation has not been identified.
3	(D.Sampath , 2014); (Williams , 2013); (Patty Murray, John P.Kline , 2015); (Kawad and Patidar , 2014)	The practice of Global Workforce challenges Assessment	Global	Globally deterministic, probabilistic, stochastic & strategic workforce challenges assessment practices are used	Technology disruptive Workforce challenges assessment in public and private sector banks of India has not been performed quantitatively.
4	(Ganoulis 2011);(Ahmed , 2009)	Practices of workforce challenging factors Assessment in Indian banking system	India	Existing practices of Workforce challenges assessment in Indian banking system is assumption based.	Workforce challenges assessment in public and private sector Indian banks due to technology disruption has yet to be done.
5	(Ganoulis , 2011); (Williams , 2013);(Moschetto , 2014)	Workforce Challenges mitigation practices & Models	Global/India	It was observed that the current practices followed for Workforce challenges mitigation in different projects other than banking systems are predominantly the conceptual because of the availability of abundant qualitative factors.	Banking Technology Disruptive Workforce challenges mitigations Model lacks in Indian Banking system.

Major Gaps

- Various Technology Disruption in Indian Banking System has not been identified appropriately.
- Workforce challenges pertain to technology disruption in Indian banking system have not been identified.
- Assessment of Subjective workforce challenges derived from technological disruptions, of Indian banks has not been done so far.

- Lack of an appropriate mitigation framework for identified technology disrupted workforce challenges.

2.7 Chapter Summary

This chapter is focusing majorly on driving the concept of this research report. This chapter portrayed the historical, current and perspective of various authors across all the themes of the literature review. This chapter helps us to form the significant research theme of the project. The research gaps identified based on authors' perspective helps us to frame the research questions and simultaneously to decide the objectives of the research project. The next chapter will elaborate on the research methodology of various research objectives which are drawn from the identified research gaps.

CHAPTER 3.0

RESEARCH METHODOLOGY

The research taxonomy can be created using three different perspectives: Pure, Applied and Hybrid (Kumar 1999). Pure research is confined to theoretical interest and has limited real-world implications, whereas in applied research, authors apply the existing available research or comprehensive academic knowledge to a specific problem and prove the concept (Hari Narayana et al., 2006). The third mode which is a hybrid research takes the joint thoughts from both pure and applied research where few innovative concepts with existing academic knowledge can be used to prove the concept. In this study, the authors, preference is applied research where the theory of fuzzy logic is applied for assessment of workforce challenging factors in Indian banking system.

Another nomenclature which is used in research design is exploratory research, where the research is executed to explore the likelihoods of undertaking a more extensive research study (Kumar 1999). In the case of exploratory research, a small sample has been investigated, and further investigation is done on a larger sample to see the applicability of the given theory.
Another significant classification of research design is conceptual and empirical research, where there is a clear distinction in the procedural literature between empirical and conceptual research. Empirical research starts with existing models and thoughts and frames hypotheses that are successively tested. Contrary, conceptual research provides an opportunity for creating new ideas and practices without any formulation of hypothesis. A mix of conceptual and empirical research method has been applied in this study.

The fuzzy logic theory approach is applied, and the relative importance of worforce challenges are quantified through an index. The applied work will make several contributions in the area of Indian banking system that would be of great interest to policymakers and regulatory bodies. The study attempts to fill the gap prevailing in the Indian banking system with respect to technology disrupted qualitative and quantitative workforce challenges identification, appropriate assessment and provides better mitigation models.

3.1 Central Research Question

This section examines the research process, the methodological approach adopted and the specific research instruments used to explore the research questions. The primary research question for the study is given below.

Does technology disruption affect banking business? How disruption technologies affect the workforce of Indian banking business? How to quantify the workforce challenges? What could be the feasible mitigation measures to reduce workforce challenges?

- **Research question Q1:** What are the various technological disruptions in Indian banking system?
- **Research question Q2:** What are the various workforce challenges faced by Indian banking system due to technological disruptions?
- **Research question Q3:** What are the impact of workforce challenges on the banking system and how to assess them?
- **Research question Q4:** What are the mitigation measures to overcome such workforce challenges that arise due to technological disruption?

3.2 Objectives

In seeking to explore the technology disrupted workforce challenges for Indian banking sector, the authors have examined earlier research from different perspectives-identification, assessment, and mitigation. This study examines the academic literature on identifying the workforce challenges in Indian banking. It explores the literature relating to the assessment of workforce challenges in the Indian banking system and the existing mitigation models, Further the entire study is validated using primary data.

These objectives of the study are:

1. To identify various forms of technology disruption in the Indian banking system.
2. To identify technology-driven workforce challenging factors in Indian banking system.
3. To assess the identified workforce challenges and its impact on Indian banking system.
4. To suggest a mitigation framework for technology disruptive workforce challenges.

3.3 The Research Process

The research process and the methodology employed is not a clear-cut sequence of procedures following a neat pattern, but a messy interaction between the conceptual and empirical world, with deduction and induction occurring at the same time (Filho, 2014). This section details the research process followed during this study. Figure 3.1. Provides a summary of the research process. This section discusses the approach used to undertake the literature review, then proceeds to examine the methodological approach adopted for assessment and mitigation, and finally, research methods used to validate the study is presented in the flowchart. (Figure 3.1) the work starts with literature review, and finally validated with primary data collected through respondents and a conceptual mitigation framework has been suggested again using literature review. All the objectives are placed in systematic manner and explained in detail in later part of chapter. the objective based methodology is explained in next section.

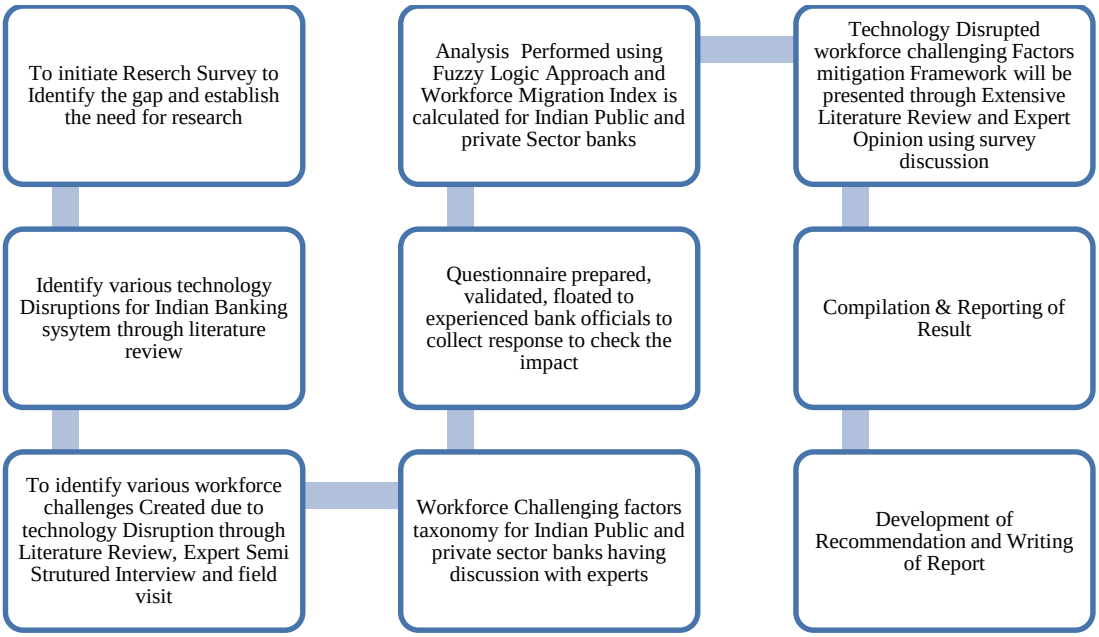

FIGURE 3.1: RESEARCH PROCESS FOR CURRENT STUDY

OBJECTIVE 1: TO IDENTIFY TECHNOLOGY DISRUPTIONS IN THE INDIAN BANKING SYSTEM.

Identify a set of critical technology disruptions through literature review, semi-structured questionnaire and focus group discussions. The research design is exploratory research.

Observational Design

- Literature review- published articles, reports

Sample Design

- Non-Probabilistic-Judgmental sampling has been used for literature validation, and focus group discussion.

Objective 2: To identify the workforce challenging factors due to technology disruption in the Indian banking system.

Identify a set of crucial factors through literature review and a semi-structured questionnaire. The research design is exploratory research.

Observational Design

- Literature review- published articles, reports
- Semi-structured interview/ questionnaire based- to finalize the workforce challenging factors with 50 officials (average experience of more than five years), bank managers, cashiers, clerks, and retired officials
- Results are validated using a normality test- Z test

Sample Design

- Workforce challenges are identified by collecting data using Non-Probabilistic-Judgmental sampling.

The research objective is linked to the identification of diverse technology-driven workforce challenges specific to Indian banking sector. The current study primarily focuses on literature linked to the Indian banking sector workforce challenges, but few global studies were also considered as a reference.After identification of challenges through literature review, later the study is validated using respondent responses which is collected using semi structured questionnaire. The details of semi-structured questionnaire responses are available in (Annexure A1)

The responses of experts are further validated and checked for significance using a Z score (Eq. 3.1).

$$z_{score} = \frac{p - P}{\sqrt{\frac{pq}{N}}} - - - - - - - - - (3.1)$$

Where p-possibility of getting real result;

q- Possibility of not getting real result;

P- Respondents responded/total sample;

N- Sample Size (Hosfete, G.; 2008)

Objective 3: To assess the workforce challenges and its impact on Indian banking system.

It estimates the workforce challenge index (WCI) and also the impact of each identified workforce challenge via its respective weights. The fuzzy logic approach has been used to assess assessment of workforce challenge index.

Observational Design

- Questionnaire framed based on the output of objective 2 (subjective questionnaire) (Annexure II)
- 5 point Likert type scale is used
- Reliability of the questionnaire is tested through a pilot study and Cronbach alpha value
- Finalization of the questionnaire after the pilot study
- The questionnaire was sent to experts in the banking sector, with respondents having an average experience of more than five years. The respondents include bank managers, officers, clerks, and retired officials.
- Responses for challenges assessment are collected and analyzed using Fuzzy Logic approach.
- Fuzzy logic results are validated using out of box method.

Sample Design

- Workforce challenges are assessed by collecting data using a probabilistic judgmental sampling.

3.4 Analysis Technique

The objective of the research mentioned above aims to find out various technology disruptive workforce challenges in the Indian public and private sector banks. The literature review is followed by a structured interview and discussion (based on Annex I) with respondents who are experts with an average experience of 15 years within the banking sector. The responses were validated using **Zscore,** and identification of workforce challenges finalized**. A**fter identification of challenge assessment of challenges was done using another questionnaire (Annex II) which was floated among the respondents, and the fuzzy logic approach is used for workforce challenge index computation.

3.4.1 Fuzzy Logic Approach

In fuzzy logic approach, to quantify linguistic workforce challenges, a specific model for workforce challenges assessment has been used which integrates expert opinions, bank visits, and relevant public experiences.

The fuzzy logic theory approach (FLT) is applied in three major stages, namely fuzzification, inference, and defuzzification, (Cheung & Kaymak, 2008). Considerable literature about the application of FLT is available both in physical and social sciences. The literature review discussed here for this study mostly covers the application of FLT to identify and quantify risk. (Matsatsinis at el.; 2003) applied fuzzy logic theory about the information system, where it was found that the systematic cravings among the variables of a processor system which is purely subjective are new and not so easy to interpret. The study by (Li et al., 2011) used a fuzzy linear programming classification method with soft constraints to analyze credit cardholders' behavior.

(Oliveira and Silva; 2004) considered qualitative factors as environmental regulation in which the relation between rules and pollution-generating processes are exhibited using a fuzzy logic approach, the study goal is to provide a judicious indulgent which are mainly costly regulation, exploitation, and extreme pollution and helps to provide optimum decision making. (Madlener & Ediger, 2004), (Tucha and Brem; 2006) proposed a quantitative approach to analyzing the functions and risk patterns in international transfer prices.

FLT approach has been used for credit card risk modeling and transfers pricing in the banking industry, but the application of FLT theory for workforce challenge assessment is at a primitive stage. The fuzzy logic method is chosen because of its capacity for modeling the subjective biased of respondent associated with problem. FLT also facilitates with less cost and simple application, high automated aptitude, ability to solve different problems with the help of knowledge of the prototype, ability to make changes in layout, and use of natural methods instead of a fixed procedure.

Since the workforce challenges are mostly subjective, the authors have attempted to quantify those challenges objectively. Therefore, an optimum method was adopted to convert the challenging subjective factors into quantitative results. The advance fuzzy logic theory[8] is a

[8] Fuzzy Logic theory deals with all qualitative and subjective factors quantifications using Boolean logic.

proven methodology for addressing subjective factors. The FLT theory converts all personal challenges into the scale of numbers using the fuzzification process.

The scoring process in fuzzy logic approach is subjective as banks attributes were determined solely by experts' visual and sensational perception towards the banking environment and via listening to their peer groups. Different experts participated in the same bank evaluation may lead to some biases and differences in the evaluation; that is, one expert might score a parameter for a specific bank different from another expert.

The fuzzy logic approach was used to overcome the uncertainties and subjectivity in the processes of parameter ratings. Fuzzy logic provides a natural way of dealing with problems in which the source of imprecision is the absence of sharply defined criteria of class membership rather than the presence of random variables (Zadeh, 1965).FLT theory is segregated into two steps firstly to estimate relative weight and later use the same relative weights to estimate workforce challenge index.

The following are the methods applied to calculate relative weights of parameters.

1. The number of ticks for each parameter/ challenge attributes in the public survey were counted. One to five attributes were taken into consideration in the calculation of overall weighted averages of parameters to promote precise preferences.
2. Each parameter had a significance grades $\mathbf{g_i}$ that demonstrates the significance of the feature compared to the others parameters/ challenge, here, in this case since 10 challenges were considered initially, and, each parameter significance considered to be same, so significance grade comes out as 1/**10**.
3. Weights of parameters/ challenge were obtained by multiplying overall weighted averages with significance grades.
4. Weights of parameters/ challenges were normalized and normalised final weights of parameters $\mathbf{(W_r)}$ were used in the fuzzy logic application, which is next step for workforce challenge index estimation. The WCI estimation start with series of matrices which are described in next section.

3.4.1 Matrices

To avoid subjectivity in responses, the procedure followed is as below,

i) Once relative weight is estimated for each parameter/challenge in each category, a 1x5 input matrix is developed which takes care of expert score for each challenge. The matrix holds five columns in which each column corresponding to attributes 1-5. The value is 1 for the attribute scored by experts for the challenge and 0 for the

other attributes. As an example in workforce challenges technological innovation score as per expert opinion is four and whose input matrix as per Equation 3**.1.** Since fourth columns in allocated as 1 and rest all are 0.

$$\mathbf{I} = |0 \quad 0 \quad 0 \quad 1 \quad 0| \qquad (\mathbf{3.1})$$

ii) Each parameter/ challenge has a fuzzy grading matrix which is of (5*5) order. The fuzzy grading matrices were developed considering the degree of error a scoring observer may cause due to subjectivity and bias in the assessment process by respondents of different banks. **Eq. (3.2)** shows the fuzzy grading matrix **(*FG*)** used for workforce challenges factor staff cost whose score as per expert opinion is 3, but further fuzzy grading matrix is shown in **Equation 3.2**

$$\mathbf{FG} = \boldsymbol{score} \begin{bmatrix} \mathbf{1} & \mathbf{0.3} & \mathbf{0} & \mathbf{0} & \mathbf{0} \\ \mathbf{0} & \mathbf{1} & \mathbf{0.4} & \mathbf{0} & \mathbf{0} \\ \mathbf{0} & \mathbf{0.4} & \mathbf{1} & \mathbf{0.4} & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \mathbf{0.4} & \mathbf{1} & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{0.3} & \mathbf{1} \end{bmatrix} \qquad \mathbf{(3.2)}$$

.

iii) The Assessment fuzzy matrix **(*AF*)** which convert the expert responses and remove subjectivity was obtained by taking the product of input matrices (*I*) with fuzzy grading matrix (*FG*) of the parameter, expressed in

$$\mathbf{AF_j = I_j \ X \ RF_j} \quad \mathbf{(j= 1 \text{ to no of variables respectively})} \qquad \mathbf{(3.3)}$$

In equation 3.3, j is the row number of the fuzzy assessment matrices.

The membership degree matrix (***MD*)** was obtained by multiplying the relative weight of parameters **(w_r)** with assessment fuzzy matrix **(*AF*)** and summing the columns resulting in a one-row matrix of order (1*5).

The weight of parameters **(w_r)** with assessment fuzzy matrix **(*AF*)** is multiplied to obtain membership degree matrix (*MD*) and is mentioned in **Equation 3.4**. Summing the resulting in a one-row matrix; known as Membership degree matrix.

$$\boldsymbol{MD = w_r * AF} \qquad \mathbf{(3.4)}$$

Once the membership degree matrix is derived, the workforce challenge index can be computed using area under the curve of MD matrix. Same is explained in analysis chapter in detail.

Objective 4: To suggest a model for mitigation of workforce challenges.

Observational Design

- Literature review- Challenging factors mitigation- a conceptual model

Workforce challenges have been mitigated using conceptual models. In the conceptual model, challenging factors have been assessed based on the results of the FLT approach. Challenging factors of public and private sector banks were mitigated using conceptual models, which will be discussed in detail later in chapter 7. The measures and framework help policymakers to mitigate the challenges of the workforce. The objective-based research model which subsequently depicted in figure 3.2.

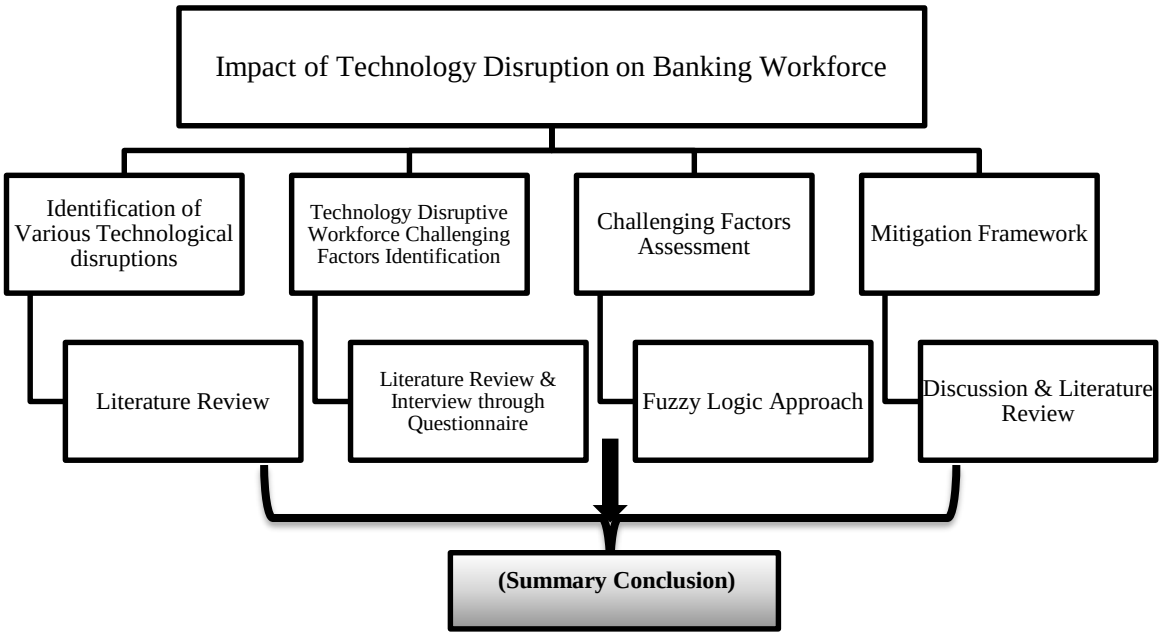

FIGURE 3.2: RESEARCH MODEL OF STUDY

3.5 Data Collection Methods

This section discusses the methods that are used to collect data from various sources. The sources used for this study is both primary and secondary.

3.5.1 Secondary Data

Every study should contain secondary research because secondary data gives an overview of what has been already explored in the concerned subject area and gaps can be derived. Secondary data helps to understand and design the research topic.

3.5.2 Sources

The sources for the literature review include research papers from various journals, articles, and books.

3.5.3 Primary Research

This sub-section elaborates the methodology that has been used for primary research. It reviews the methods used for data collection, validates the choice and reliability.

3.5.4 Primary Data methodology

The primary data is collected through survey method which is used to create a challenging factors index assessment. In the case of qualitative information, the dimensions could help to explain and understand the observed similarities and differences between corresponding phenomena in different banking systems.

Therefore, the initial idea is to collect expert opinion through focus group discussion. The respondents are at the level of Branch Managers or higher officials. The views and opinion of the experts are categorized into various workforce-related challenges. An intensive literature review has been done to identify challenges specific to the workforce, triggered by disruptive technologies. The challenges are then consolidated and converted into a questionnaire.

3.5.5 Sample size

Questionnaire surveys usually involve only a proportion, or sample, of the population in which the researcher is interested (Veal, 1997). Although it is said that there are no set rules on how many questionnaires should be administered or interviews given, the aim should be to acquire a range of responses that are as representative as possible to allow the fulfillment of the objectives of the study and to present answers to critical questions (Bell, 2001). In the current research, it has been decided to send the questionnaires to all technical, managerial, operational people and employees and retired officials of public and private sector banks, who have average experience range from 3-20 years and those who are directly or indirectly related with the workforce in the Indian banking system. Retired officials help to cover the transition perspective towards technology disruptions.

Initially, for identification of workforces, the semi-structured questionnaire was discussed with 50 bank experts (an average experience more than 15 years) and mainly one to one meeting discussion or over phone responses were collected. Finally, the responses were validated using a Z score so that workforce challenges can be confirmed for the Indian context.

After identification, Questionnaire for challenge assessment was administered by 635 bank officials from ten selected banks. (Details mentioned in the next section 5 private and 5 Public sector banks). Every selected bank responses were in the range of 61to 63. Over the period of

response collection, total 317 public sector and 318 private sectors responses were received. The respondents were mainly senior bank officials, middle management, retired officials, who holds average experience between 3-15 years. Authors 'assured to have at least 10% retired employee's responses across all selected banks. The questionnaire was send to respondents using various platforms in the structured google form through Linked-in, emails collected through head offices, circulating emails to head HR. (Annexure I & II will highlight the questionnaire). The exciting part of data collection was that employees were keen to share their experiences even on social networking sites, in personnel and over phone employees expressed their thoughts and even suggestive measures. The questionnaire was send around 2000 bank officials where responses rate was around 40% and after data mining and removing missing responses finally 635 responses were selected for analysis.

3.5.6 Banks Identified for Data Collection

Leading banks market capitalization and asset base are considered for this study. As on September 2017, the top 5 public and private sector banks are mapped in table 3.1 below:

TABLE 3.1: SAMPLING OF SELECTED BANKS SUMMARY SHEET

Public Sector Banks			*Private Sector Banks*		
Bank Name	Market Cap (Rs. cr)	Total Assets	**Bank Name**	**Total Assets**	**Market Cap (Rs. cr)**
SBI	233,626.44	2,224,751.74	**HDFC Bank**	715,948.96	479,038.29
Bank of Baroda	33,940.51	496,362.58	**ICICI Bank**	599,298.68	187,992.11
PNB	31,015.14	596,475.62	**Axis Bank**	479,314.14	125,339.84
Canara Bank	20,797.64	484,387.86	**Yes Bank**	183,985.14	85,212.92
Central Bank	17,576.06	226,286.86	**Kotak Mahindra**	174,243.26	194,966.08

3.5.7 Reliability, validity and representativeness

Each research and research method should be examined critically on its reliability, validity, and representativeness (Finn et al. 2000). The reliability of a method is related to the consistency of the obtained results. In the case of a questionnaire, the questions should obtain the same answer from a person each time if it is asked, to ensure this, the questions should be framed in simple words (Finn et al. 2000; Bell 2001). The rationality of a research mechanism indicates if it measures what it is supposed to measure and if the collected information reflects

the phenomenon that is studied (Veal, 1997). Finally, the representativeness of a research's results indicates to what extent these results can be generalized (Finn et al. 2000).All aspects reliability, validity and representativeness were assured at every step of study via chronbach alpha, out of box analysis and pilot study. Same has been discussed in detail in current chapter and chapter 6.

3.5.8 Pilot Study

A pilot study has been conducted to understand the behavior of respondents towards questionnaire. Initially, to bank officials across all grades who either associated with the bank as an officer, retired, managerial grade, junior staff or any other person who is linked with technological disruptions at various grades across banking business. The reliability of the result was ensured via paying special care that the questions were clear and easy to answer. Where needed, specific concepts were explained to ensure that there could be no mistake while filling out the questionnaire.

Concerning the validity of the results, the Cronbach alpha of the questionnaire was checked twice. After taking 200 responses from each bank Chronbach alpha [9]comes as 0.72. Later after taking 400 responses, the Cronbach alpha was improved to 0.74. When the responses were increased to 635, Chronbach alpha score has come out to be 0.79. Cronbach alpha proves the validity of the responses which is collected through a survey. The physical verification of the responses were also done, to remove random responses.

A pilot study has been conducted at the initial stage and questionnaire was circulated to 50 respondents. Fuzzy logic theory has been applied to analyse the results. Later the final study was performed using 635 responses.

After estimating workforce challenge index, the same index is validated using out of box analysis where the sensitivity of responses were analyzed. The questionnaire survey proved its validity with Cronbach alpha. The accuracy of variables in the questionnaire been cross-checked with concerned managers and senior officials of top commercial banks of India.

[9] Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability. A "high" value for alpha does not imply that the measure is unidimensional. If, in addition to measuring internal consistency, you wish to provide evidence that the scale in question is unidimensional, additional analyses can be performed. Exploratory factor analysis is one method of checking dimensionality. Technically speaking, Cronbach's alpha is not a statistical test – it is a coefficient of reliability (or consistency)

3.5.9 Description of the questionnaires

Two questionnaires were prepared, one for workforce challenge identification and the second one for assessment (Annexure A1 & A2). Selected respondents were asked to administer the questionnaire. An email with a cover letter and a questionnaire was sent to the respondents. For workforce challenge identification a semi-structured questionnaire was prepared as mentioned in Annexure A1.

Another set of the questionnaire is used for challenge assessment for both public and private sector banks. 25 questions were framed in the questionnaire(Refer A2). Question 1-7 represent the general information of the respondent followed by questions related to workforce challenges. While collecting the responses in the questionnaire, specific questions were designed to collect positive and negative responses. Now, for example, the question number eight as per Annexure "The influence of technology in banking would increase the demand for tech-savvy employees, which the banks have to hire by offering a high salary." Now while answering if the respondent strongly agrees which is five that considered being extreme challenge contrary 1 reflects a low-level challenge. So these type of questions were put in non-reverse sequence. Contrary there are questions say "I have become more skilled, more effective in my work because of my bank's exposure to new technology".in this question the challenge will be extreme if respondent will say 1 as strongly disagree so while weight computation responses were reversed say 1converts to 5 so that challenge assessment may happen in same order.

3.7 Chapter Summary

The methodology that was used to explore the research questions set out in this section has been described and critically evaluated. While doing so, it has provided an example of how research can differ from the ordered and rational approaches of the more prescriptive research methodology. The details of objectives has been decided in subsequent chapters.

CHAPTER 4

Technological Development & Indian Banks

4.0 Introduction

The term "Banking Technology" refers to the use of sophisticated information and communication technologies together to offer better services to its customers in a secure, reliable and affordable manner and sustain competitive advantage over other banks. It is an amalgam of financial technologies, Big Data analytics, Data mining, Block Chain, Biometrics, and Cybersecurity. The world has entered into the arena of "Digital Darwinism" where technology and society change much faster than companies can adapt to the changes. What we see today as modern banking features, the world of banking in our palm, anytime anywhere banking, payments, and transfer at the dawn and dusk, raising loan without seeing the lender are due to the advancement in technology. The Reserve Bank of India has been proactive in building the technological infrastructure to make Indian banks competitive.

Information, Communication, and Technology are the backbone of the banking business, in chapter 1 evolution of technology and banking business has already been discussed. The use of IT has become an essential ingredient in delivering products or services from the purchase of grocery to use Robots to perform a complex task. The Banking industry has immensely benefited by the growth in technology. Since the use of Advanced Ledger Posting Machines during 1980, the influence of IT in banking is impressive and paved the way for advanced technologies like Block Chain and Artificial Intelligence. Technology has resulted in improved quality of service, any time/anywhere banking, focused product delivery, cross-selling opportunities, multi-channel touch points for consumption of services.

Now let's have an insight of how technology has changed the banking process from old physical bookkeeping process to today's advanced computerized systems:

4.1 Major Drivers of Banking Technology

1.0 Digitization of India

The Digital India programme is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy. "Faceless, Paperless, Cashless" is one of the professed roles of Digital India. The initiative includes plans

to connect rural areas with high-speed internet networks. India is a home for more than 1 billion mobile users. As per the estimates of TRAI. India's telecom subscriber base, mobile, and landline combined, touched the 1.18 billion mark at the end of February 2017. The country's telecom market is the second largest in the world after China regarding subscriber base. With the number of mobiles in the country crossing one billion of which more than 30 % are smartphones, banks are proactive to give the best digital solutions to the customers for payments and other banking services from anywhere, anytime.[10]

Digitalization – A Revolution in India

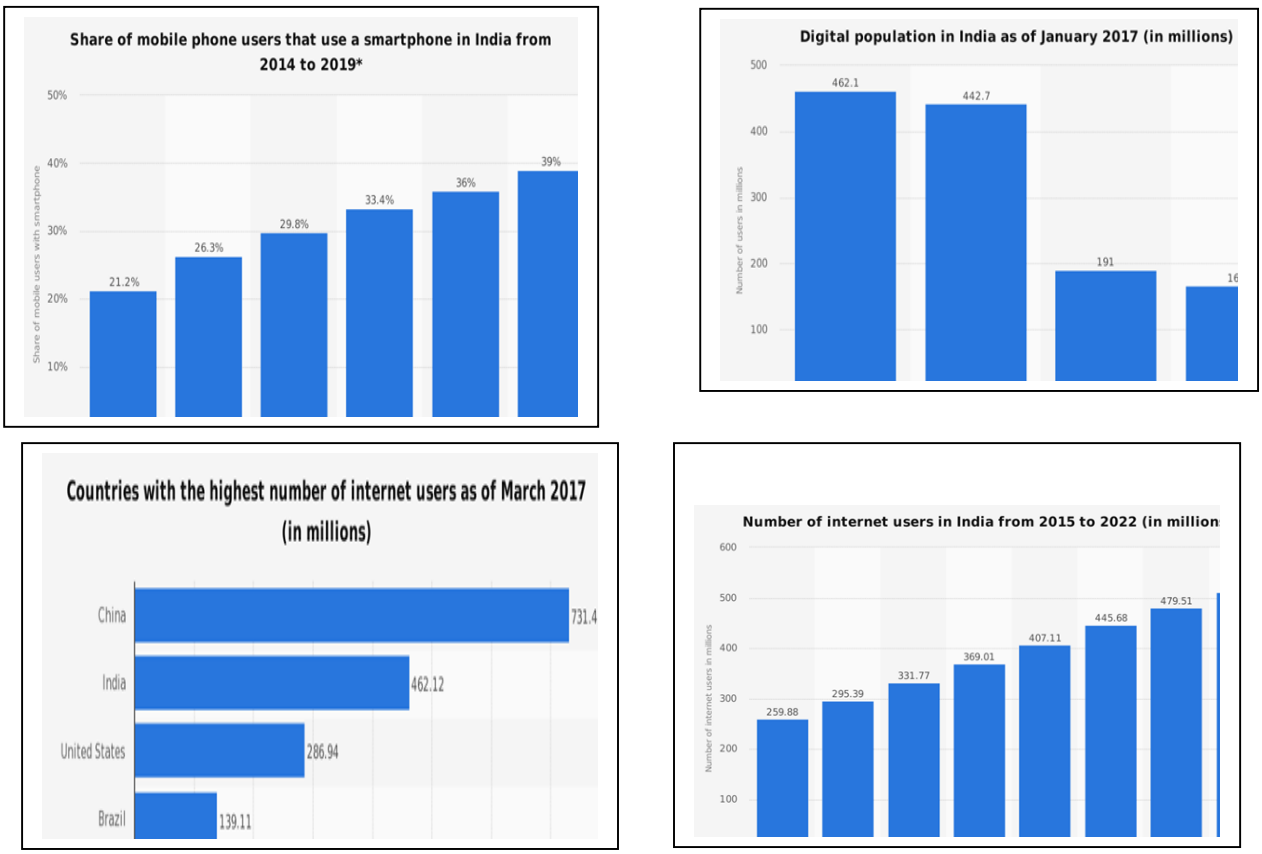

FIGURE 4.1: DIGITIZATION: AN INDIAN REVOLUTION

The JAM (Jan Dhan, Aadhaar, and Mobile), an initiative of Government of India has brought all Indian under a common financial, economic and digital space. "Within reach of the country is what might be called the 1 billion-1 billion-1 billion vision. That is 1 billion unique Aadhaar numbers linked to 1 billion bank accounts and 1 billion mobile phones. Once that is done, all

[10] V G Kannan, CEO, Indian Banks Association (IBA)

of India can become part of the financial and digital mainstream," Arun Jaitley, Finance Minister.

The seeding of Aadhaar with bank accounts has led to linking 52.4 crore unique Aadhaar numbers to 73.62 crore accounts in India. JAM has entered the Guinness world record for opening 1.8 crore bank accounts within a week. Under PAHAL Yojana, LPG subsidies are directly deposited into the bank accounts. Under this scheme, more than 14.62 crore people are receiving direct cash subsidies. The government makes a direct transfer of Rs 74,000 crore to the financial accounts of 35 crore beneficiaries annually, at more than Rs 6,000 crore per month. These transfers are made under various government anti-poverty and support schemes such as PAHAL, MNREGA, old age pensions, and student scholarships. (RBI, 2017)

Table 4.1 Details of beneficiaries for Indian banking system till 2017

Pradhan Mantri Jan - Dhan Yojana (All figures in Crore)

Beneficiaries as on 08/11/2017					
Bank Name / Type	***Number of Beneficiaries at rural/semiurban center bank branches***	***Number of Beneficiaries at urban metro center bank branches***	***Number of Total Beneficiaries***	***Deposits in Accounts(In Crore)***	***Number of Rupay Debit Cards issued to beneficiaries***
Public Sector Banks	*13.50*	*11.20*	*24.70*	*53711.31*	*18.44*
Regional Rural Banks	*4.16*	*0.76*	*4.92*	*11862.96*	*3.62*
Private Sector Banks	*0.60*	*0.39*	*0.99*	*2113.46*	*0.92*
Grand Total	***18.25***	***12.35***	***30.60***	***67687.72***	***22.98***

1.1 Digital Payment Methods

The Government of India has introduced various digital payment systems to convert India into a less cash society like banking cards, i.e., Rupay, Visa, Master, USSD, BHIM, Aadhaar Enabled payment system, UPI.

Banking cards offer consumers more security, convenience, and control than any other payment method. The wide variety of cards available – including credit, debit and prepaid –

offers enormous flexibility, as well. These cards provide 2-factor authentication for secure payments, e.g., secure PIN and OTP. RuPay, Visa, MasterCard are some of the examples of card payment systems. Payment cards give people the power to purchase items in stores, on the Internet, through mail-order catalogs and over the telephone. They save both customers and merchants' time and money and thus enable them for ease of transaction.

Under the service of Unstructured Supplementary Service Data (USSD) allows mobile banking transactions using basic feature mobile phone, there is no need to have a mobile internet data facility for using USSD based mobile banking. It is envisioned to provide financial deepening and inclusion of underbanked society in the mainstream banking services.

Bharat Interface for Money (BHIM) is an app that lets the user make simple, easy and quick payment transactions using Unified Payments Interface (UPI). One can make instant bank-to-bank payments and Pay and collect money using a just Mobile number or Virtual Payment Address (VPA).

Aadhaar Enabled Payment System (AEPS) is a bank-led model which allows online interoperable financial transaction at PoS (Point of Sale / Micro ATM) through the Business Correspondent (BC)/Bank Mitra of any bank using the Aadhaar authentication.

Unified Payments Interface (UPI) is a system that powers multiple bank accounts into a single mobile application (of any participating bank), merging several banking features, seamless fund routing & merchant payments into one hood. It also caters to the "Peer to Peer" collect request which can be scheduled and paid as per requirement and convenience. Each Bank provides its own UPI App for Android, Windows and iOS mobile platform(s).

The growth of Digital Transaction in India 2007 and 2017

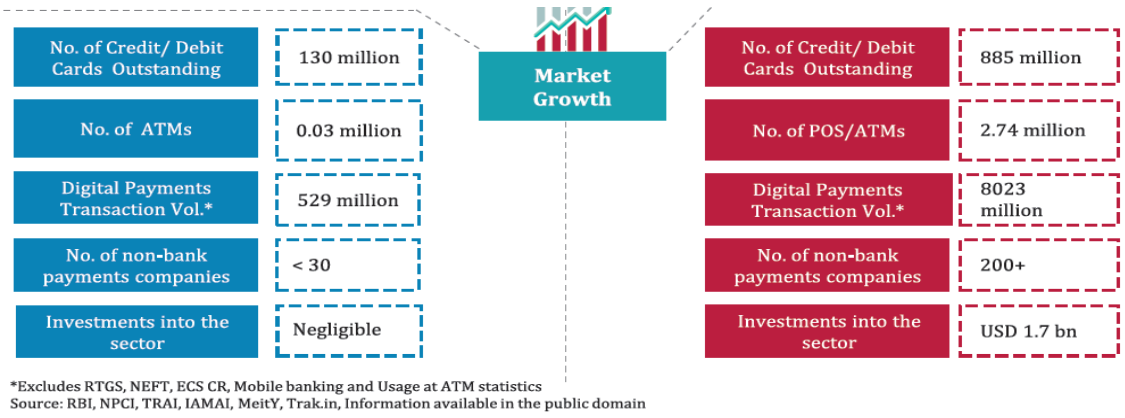

FIGURE 4.2: PAYMENT MECHANISM IN INDIAN BANKING SYSTEM(GROWTH OF DIGITAL TRANSACTIONS IN INDIA)SOURCE: PAYMENT COUNCIL OF INDIA

2.0 Financial Technologies

The financial technologies are evolved with time, the transition from 2007 to 2017 can be visualized in Fig 4.3. The usage of mobile wallets, the point of sales, Micro ATM's, internet banking, mobile banking are few advancements which are observed during this duration.

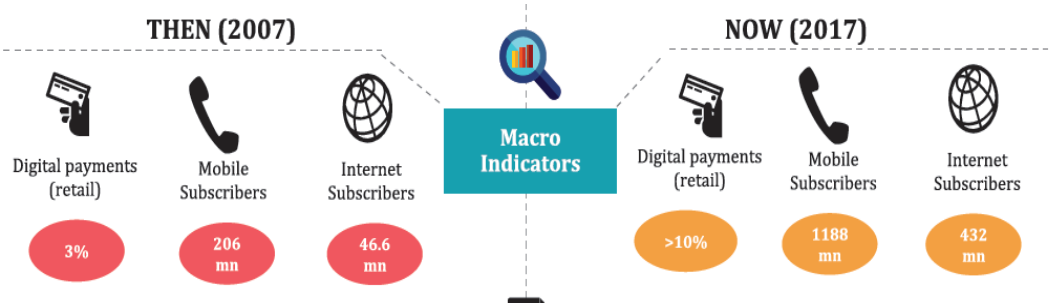

FIGURE 4.3: EVOLUTION OF FINANCIAL TECHNOLOGY SYSTEM IN INDIA

Source: Payment Council of India

To highlight its applications further mobile wallet is a way to carry cash in digital format. The customer can link their credit card or debit card information in a mobile device to mobile wallet application, or they can transfer money online to the mobile wallet. Instead of using the physical plastic card to make purchases, customers can pay with their smartphone, tablet, or smartwatch. An individual's account is required to be linked to the digital wallet to load money into it. Most banks have their e-wallets and some private companies. e.g., Paytm, Freecharge, Mobikwik, Oxygen, mRuppee, Airtel Money, Jio Money, SBI Buddy, Itz Cash, Citrus Pay, Vodafone M-Pesa, Axis Bank Lime, ICICI Pockets, SpeedPay.

A point of sale (PoS) is the place where sales are made. On a macro level, a PoS may be a mall, a market or a city. On a micro level, retailers consider a PoS to be the area where a customer completes a transaction, such as a checkout counter. It is also known as a point of purchase.

Micro ATM meant to be a device that is used by a million Business Correspondents (BC) to deliver essential banking services. The platform will enable Business Correspondents (who could be a local grocery shop owner and will act as 'micro ATM') to conduct instant transactions.

Internet banking, also known as online banking, e-banking or virtual banking, is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions through the financial institution's website.

Mobile banking is a service provided by a bank or other financial institution that allows its customers to conduct different types of financial transactions remotely using a mobile device

such as a mobile phone or tablet. It uses software, usually called an app, provided by the banks or financial institution for the purpose. Each Bank provides its mobile banking App for Android, Windows and iOS mobile platform(s).

3.0 Data Analytics

The evolution of Technology has led Banks to move beyond "Core Banking Solution" and offer tech-enabled delivery channels. The substantial growth in tech-savvy customers will reduce the need for branch banking and triggers the growth of branchless banking. Banking started offering most of the technology-enabled services. In future, the scope of banking services is not only confined to Deposit and Credit but also to meet the growing demands for retails transactions.

There is a change in consumer behavior when it comes to financial services. The consumer expects remainders, his spending habits, maintaining records of his/her spending, payment alerts, historical analysis of transactions and so on. There are a significant number of startup offering such value-added services. Traditional companies have also started embracing big data analytics to expand their businesses applications of big data. Akshaya Patra Foundation in Bangalore uses data analytics in identifying a cost-effective answer for conveying foods to schools, in another example where Reliance Jio has used big data analytics as a unique selling proposition to attract millions of customers. Also, NITI Aayog had started a multi-pronged way to deal with further the advancement of India's ability in Big Data. NASSCOM has foreseen India's big data industry will catch 32% of the worldwide market to reach $16 billion by 2025 from the present level of $2 billion.

Banks have the potential to leverage Data Analytics to optimize its cost of operation and provide value-added services to its customers. Data Mining techniques are beneficial to the banking sector for better targeting and acquiring new customers, most valuable customer retention, automatic credit approval which is used for fraud prevention, fraud detection in real time, providing segment based products, analysis of the customers and transaction patterns. It facilitates banks for automatic prediction of future trends and consumer behaviors and discovery of unknown patterns in the existing database. A shift towards data analytics requires skills in text mining, data mining, machine learning in the paradigm of analytics and apply the outcome to solve banking problems.

4.0 Cloud Computing

Cloud computing is the delivery of computing services—servers, storage, databases, networking, software, analytics and more—over the Internet ("the cloud"). Cloud computing can provide broad capabilities that banks need on a flexible basis to help them do much more than cut infrastructure costs. It helps banks to transform their business processes and enhance their ability to grow in new sectors or regions without the time and cost burdens involved with establishing a physical presence. Another application of this technology is to create new markets and services to differentiate from competition and improve the ways customers' access and use the bank's products and services. Now the question arises what is driving the banks and other financial institutions to adopt the cloud is mainly the industry pressure to consolidate IT costs. ***Table 4.2: Public Cloud service market value in India***

The public cloud services market value in India from 2015 to 2020 (in a million U.S. dollars)	
Year	Revenue in million U.S. dollars
2015	957
2016	1,353
2017*	1,936
2018*	2,626
2019*	3,392
2020*	4,282

Source: Garner Survey Report 2017

5.0 Block Chain Technology

The blockchain is a global network of computers that jointly manage the database of financial transactions. It creates a block for every transaction, and a system of code allows the individual to make changes in the code only related to his/her transaction. Cryptocurrency like Bitcoin is traded using Block Chain Technology. World Economic Forum report predicts that by 2025, 10% of GDP will be stored on blockchains or block chain-related technology. The blockchain is a technological advance that will have wide-reaching implications that will not just transform financial services but many other businesses and industries.

Blockchain technology can potentially disrupt the present model of banking business; where it has the potential to minimize the cost of operations and reduce the instances of fraud. For instance, Financial institutions spend anywhere from $60 million up to $500 million per year to keep up with Know your Customer (KYC) and customer due to diligence regulations

according to a Thomson Reuters Survey. These regulations are intended to help reduce money laundering and terrorist activities by having requirements for businesses to verify and identify their clients. Blockchain would allow the independent verification of one client by one organization to be accessed by other organizations so the KYC process would not have to start over again. The reduction in administrative costs for compliance departments would be significant. The technology can be used in payment systems.

The application of blockchain has now shifted to various areas such as payments, exchanges, smart contracts, digital identity, documentation, clearing, and settlement. Some of the major factors driving the growth of the blockchain technology market are transparency and immutability, faster transactions, and reduced total cost of ownership. The blockchain technology also offers other key benefits such as trustless exchange, durability, and reliability, and empowers the users to control all their information and transactions. In coming years the key opportunity areas for blockchain technology would be a disruption in technology across various industries; high adoption of blockchain technology for payments, smart contracts and digital identities; and evolution of a new breed of programmable blockchain technology platforms.

6.0 Artificial Intelligence

Artificial intelligence is the blend of three advanced technologies – machine learning, natural language processing, and cognitive computing. The concept of Artificial Intelligence is to simulate the intelligence of humans into artificial machines with the help of sophisticated machine learning and natural language processing algorithms. A significant amount of Research and Development of Artificial Intelligence to overcome the barrier of human intelligence such as the speed and scalability. It has tremendous potential to be absorbed by banks to increase its scalability, increase the speed and accuracy of transactions and effective customer relationship management.

Banks in the area of fraud detection, chatbots to interact with customers, algorithm trading for trades in the stock market, data management, and business analytics mostly rely on Artificial Intelligence. Major banks across the globe are shifting from rule-based software systems to artificial intelligence based systems which are more robust and intelligent to the anti-money laundering patterns.

Chatbots are artificial intelligence based automated chat systems which simulate human chats without any human interventions. They work by identifying the context and emotions in the

text chat by the human end user and respond to them with the most appropriate reply. Chatbots are already being extensively used in the banking industry to revolutionize the customer relationship management at a personal level.

7.0 Cyber Security

Banks in India have progressively adopted new technologies in operations and customer services. There has been a growing demand for technology-enabled services. The changing dynamism of demographics with more millennials turning out to become customers of banking and financial services. As a result, there has been a tremendous shift in customer's preference towards digital banking. This pragmatic change in digitization would enhance the customer experience and optimize the cost of service to the banks. While these moves are likely to benefit the banks, the flip side of the change is the cyber threats the industry need to address. Banks are seen to be more proactive in investing and improving security practice in comparison to several other sectors. Banking is increasingly operating as a 'boundary-less' ecosystem such measures may still be inadequate considering the challenges with the traditional approach to IT security are Proliferation of attack vectors and enhanced attack surface.

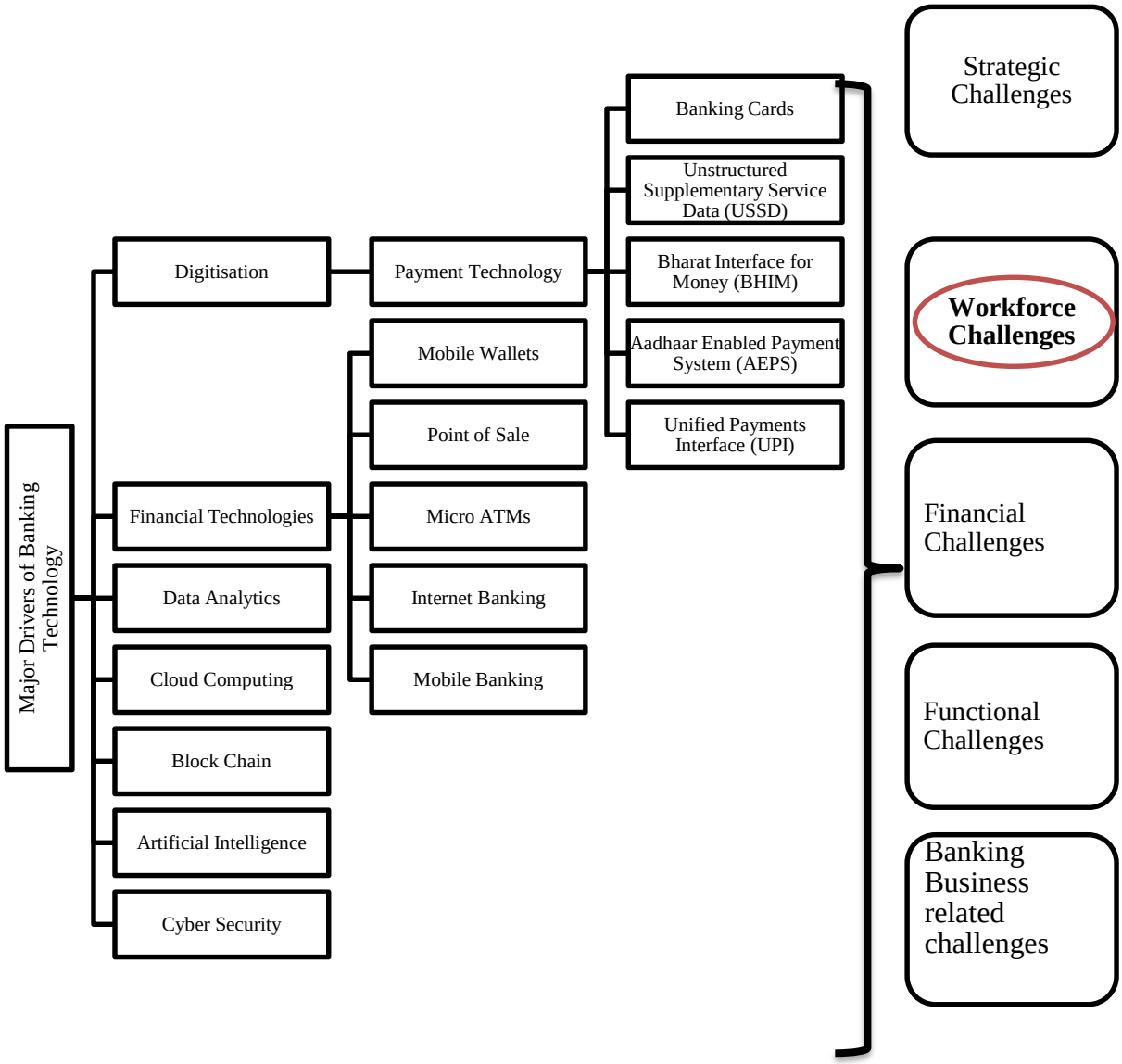

FIGURE 4.4: MAJOR TECHNICAL DISRUPTIONS IN INDIAN BANKING BUSINESS AND IMPACTED DOMAINS

4.2 Chapter Summary

The content of chapter has been summarised in figure 4.4. The chapter highlights the various effect of technological disruption adopted by banking business with time. The significant technological disruptions include cybersecurity, blockchain, artificial intelligence, cloud computing and data analytics. These disruptions affect multitudinous dimensions of Indian banking, i.e., financial, workforce, operational, functional areas.

CHAPTER 5

Technological Development and Workforce Challenges

5.0 Introduction

Industries across the world are being turned on their heads due to continuous change in the business environment. Among various driving forces, technology plays a significant role in business transformation. The emergence of new technologies has led companies to design and deliver innovative products and services at an optimum cost to the customers. Various new technologies have been redefining the business model. Consider for a moment that the world's largest retailer does not own or operate any shops. The biggest taxi company owns no cars. Some of the largest property rental businesses possess no properties of their own. Technological disruption is well underway across a swathe of industries. Deloitte's report on the future of jobs indicates that 25% to 31% of business services jobs are at risk of automation in the next 20 years[11]. Repetitive and highly structured jobs would disappear, while new highly skilled oriented roles will be created simultaneously[12]. The transition is set to trigger a challenge for recruitment teams across industries to hire for newer skills and reskill the existing workforce.

The banking industry in India had transformed from an era of banking regulation into an era of the technology revolution. The modern digital technology has provided many options to the customers. Gone are the days where the customers remain locked in with a particular bank for a lifetime. Banking in today's parlance is no more a brick and mortar model. The customers would expect banks to be slick and at any time, anywhere banking. The tech-savvy millennials would perceive banking transactions as everything else they interact with on a daily basis. The new generation of financial technology firms poses a threat to banks by offering alternate sources of banking services like e-wallet and digital payment services.

The impact of technology is to be seen in all aspects of banking business say managing operations, finances, human resources. All major banks have been streamlining their processes to try and position themselves to compete with their peers. Unlike in the past, banks are making a significant investment in technology to enhance digital capabilities to serve customers with minimum human interaction.

[11] https://www2.deloitte.com/uk/en/pages/press-releases/articles/jobs-at-risk-of-automation.html
[12] http://www.reesdraperwright.com/workforce-challenges-evolving-banking-sector/

According to a report by Deloitte, more than a quarter of jobs in the business services sector are at high risk of automation in the next twenty years, which is the result of the falling cost of technology combined with the rising cost of labor. A statistics shared by Deloitte in the year 2017 states that 3,300,000 jobs currently classed as business services*, 800,000 (25%) to 1 million (31%) have a high chance of being automated.[13] This figure is lower than the national total (36%), highlighting that the business services sector is less exposed than other areas of the UK economy. Also, almost half of business services jobs are at low risk of automation (45%) with the remainder in the medium risk category.

Since these technological disruptions have an impact on banking business in various aspect, it is necessary to know the exact effect on banking business. All the elements are affected by technological disruptions, but operations are at its peak. Processes are so far solely dependent on human resource, so it is necessary to know the exact impact of these technological disruptions on banking sector human resources. Numerous concerned areas have their viewpoint on banking sector impacted by technology, so a view of consulting industries is highlighted below.

5.1 Technology disruption and Workforce Challenges

The interaction between mind and machine has been the principal force to drive innovation in the financial service industry. Human beings started using machine tools to merely the work. It had led to the first phase of the agricultural revolution and then the industrial revolution in the past. The current phase of the digital revolution is marked with interwinding of mind and machine. We started using machines to think faster than the human brain and perform the task with high levels of accuracy. Financial institutions across the world are setting up an innovation lab to conduct a pilot study with new technologies before enterprise-wide implementation. According to Capgemini, 87% of financial services firms have set up innovation labs to enable rapid prototyping. These developments would bring innovation in products and services. Banks have to assimilate the business model in synchronization with the technology development. While technology is the backbone for progressive growth, lack of technology absorption may disrupt the banking business. Such disruptive technologies create business and workforce-related challenges.

[13] https://www2.deloitte.com/uk/en/pages/press-releases/articles/jobs-at-risk-of-automation.html

FIGURE 5. TECHNOLOGY DISRUPTION AND WORKFORCE CHALLENGES

5.2 Workforce challenges and its impact on banking business

The technical disruptions which are challenges for the banking business, it could emerge due to any external or internal environment. Finally, it would have a negative impact on banking business revenue, or it might increase the cost are considered to be business related challenges. This challenge though it works as a banking challenge it has an impact on the workforce of the banking business at senior or decision-making level. These challenges though not served by all employees but different segments are suffering simultaneously these challenges and which is also an assimilated factor of the banking business. This section is trying to identify the banking workforce problems though it occurs to any group of people liked to banking business due to technological disruptions. The several other sub-challenges are considered and kept in under this section.

1. Skill Deficiencies

Technology becomes a real-time occurrence nowadays, whether the bank wants it or not, banks have to upgrade their systems to remain steady in business. Managing excess cost is a challenge for banks but, at the same time identifying the relevant human resource is an additional challenge for banking business. In the process of identifying the relevant skill set for specific job roles banking sector has to approach people from a similar background, i.e., who carries a degree either in the banking sector or holds primary education in finance so that candidate can easily relate to the job role. Banks should collaborate with educational institutes to develop the specific skills required for the banking industry. The advantage of this kind of collaborations may provide a stable platform to prospective candidates who can be industry ready after their education. There are some collaborations observed between banks and universities, where the educational institute designs the curriculum to meet the skill demand of banks. In this manner, the university curriculum is always mapped with latest technological advance practices, and

educational institutes may also be assured about their student's placements, prospective job profiles, and work environment.

2. Work Management

The role of technology is to minimize the human intervention and makes the work more comfortable for the system. Usage of technology in processes and services requires the employees to be well groomed and trained in the new technology. Deficiency in any one would hamper the benefits of technology, and it may act as an weakness than a booster. Improper implementation of technology may have an adverse impact on the work-life balance of employees.

a) Work Efficiency

Another emerging challenge for those responsible for workforce management is the increasing workload for all employees with the advent of new schemes has been imposed by the government from time to time. Even bank business is also increasing leads to the workload of employees are increasing in the same proportion because the number of new hires will be relatively less. The workload of employees is increasing because now it is compliance as per regulatory boy of the banking industry that a specific number of work hours need to be put.
The government of India is committed to creating a platform for every Indian to have a bank account which is involved in a lot of human interventions. In another scheme under Jan Dhan Yojana provides zero balance bank account to all citizens. The targets were set so high as per that by January 17, 2015 banks had opened 11.50 crore bank accounts, covering 99.74 percent of the households that were outside the banking system against the original target of 7.5 crore accounts that Prime Minister Narendra Modi had set for achieving by January 26, 2015. The excessive work has increased the workload of various employees. The direct transfer of subsidy and other initiatives has increased the workload of employees. Banking organizations have greatly expanded the scope and complexity of their activities and that to be within a stipulated time leads to hampering the efficiency of the workforce adversely. During demonetization employees were working continuously without a break for 15 days at a stretch has created lot many troubles to bank employees vis a vis impact on banking business.

b) **Work-life balance- ease of doing the job**

The private and public sector banks which pool under the services sector are the primary drivers of economic growth in India, and it contributes significantly to the BFSI sector. This service

sector heavily depends on human resource since the services assured to customers are mostly in the form of human support. Employees working in this sector are young, view their careers as supreme and have different mindset relating to social normal life balance. These employees typically work in intensified result-driven culture. They work long hours and often must accommodate their working hours in the time zones of major financial hubs. Since many banks extending operating hours, there is a need for work-life balance practices as well. In work life, the life describes a person's or group's standard of living environment, public health, safety, and general surroundings while work-life encompasses things that affect their wellbeings such as salary and benefits. Significant work-life programs for banks include part-time work, telecommuting, and flexible benefits. Workplace life is increasingly a significant part of the total benefits package.

(Samuel & Vivienne, 1996) Studies revealed that women balance their work and family identities by trading-off one role for the other. In contrast, men can simultaneously identify with work and family roles. (Elizabeth et al., 2005) investigated the influence of gender, and tenure status in balancing parenthood and career and results revealed that women reported more celebrated career and family stress and perceptions of less institutional support for the balance of work and family. (Halpern, 2005) Highlighted that despite changes in the workforce, the world of work is still primarily organized for a family model that is increasingly rare one with a stay-at-home caregiver be it for child care or younger children or older relatives. Therefore, he makes the case to align the needs of working families and employers. Building on past research, the theory of reasoned action and expectancy theory and a survey of 1972 managers in a large government agency.

3. Employee Adaptability to change

The fast pace growth in technology necessitates the banks to be agile enough to understand the technological environment both domestically and globally. Also, the system should be well prepared to absorb further changes. The banks must also sense the emergence of startups and financial technology firms and look at innovative ways of customer attraction and retention. The public sector banks are facing the problems of the aging workforce on one side and up-gradation of technology on the other hand. It requires the banks to be agile in implementing new technology. The adaptability of employees should be enough to absorb further shocks and resist the changes whichever is coming on the way. Any system emphasis on better adaptability so that the survival of system will remain for a relatively more extended time. The banking business is susceptible since it is holding third persons financial responsibility, so it is essential

for banking business to be ready for any new changes which regulatory system is applying for customers security.

a) Adequacy

The Human resource challenge of public sector banks is more crucial as compared to the private sector banks. Due to an aging workforce, the public sector banks will witness the unprecedented loss of skills and competencies in the form of retiring senior and middle management executives. The challenges which are predicted that public sector banks will face shortly are adequacy of employees in the banking business. The adaptability is ensured via an adequate number of bank employees also. There are few facts which reveal the adequacy of the banking business. India's Public Sector Banks have employed some 700000 people, many of whom are to retire in the next few years. (PWC, 2014).

The business has grown manifold in the past decade, but employee's strength has dwindled. In the last decade, at least 100,000 employees left the industry, responding to the first ever golden handshake scheme in the sector. Although the scheme is in place, there are not many recruitment drives. (Rani & Garg, 2014) Banks have embraced technology, but that has not been enough. (Ciutiene & Railaite, 2015) mentioned that Banks are going through an excellent workforce crunch.

There are reports by Ernst & young which states that in the next ten years, they will have to hire around one million people to keep their branches running an account for retirement and natural attrition. Finding the right candidate for a leadership position will be even more robust (Williams, 2013). (Chakrabarty, 2010) Says many people are leaving at the same time which has prompted the Reserve Bank of India to call the ten years opening starts with 2010 to 2020 [14]. The last decade is declared a year of retirement. This peculiar situation facing state-owned banks is as much an outcome of the slowdown in recruitment in the 1990s due to lack of retirement planning[15].

[14] A report by Boston Consulting Group endorsed the above fact that PSU Banks will need to employ 9 to 11 lakh employees over the next five years, The report, which includes a survey of about 14,000 customers, 50,000 Bank employees and analysis of data obtained from about 35 Banks in the country, said about half of the employment will be due to attrition.(Manikyam , 2014)

[15] Even the Khandelwal committee, which was set up to address the human resource challenges of state-owned Banks, while acknowledging the manpower shortage Banks are facing, said: "The leadership gaps in public sector Banks are palpable. In the next five years, 80 per cent of general managers, 65 per cent of deputy general managers, 58 per cent of assistant general managers and 44 per cent of chief managers would be retiring. Retirements in public sector Banks will continue to increase and peak by 2017. In total, 1.8 lakh employees will retire and will

b) Preparedness

The dimension which measures the adaptability of employees is the preparedness of employees for upcoming twists. Today Banking has become increasingly relationship-driven industry since here the primary task is to get the best value out of the customers. Banks are also not sure whether the prospective candidates are serious in pursuing banking as a career. It is also the fact that since the salary package is not attractive to attract new talents, there is an enormous attrition rate of over 30% among the recruits in all cadres. Banks are unable to retain them with over 100,000 experienced employees of PSBs retiring on superannuation in the next five years. Many PSBs are also facing the problem of employee turnover, and public sector banks will edge out in competitive edge to give the best value out of the customers if the management of the bank is not quite alive to initiate various measures to contain it.

At a glance, it is evidenced that the growth rate of deposits, advances, and total business is more than the growth of branch expansion and employee recruitment. It shows that the business performance of nationalized banks is improved during the study period. However, the coefficient of variation of branch expansion and employees recruitments are relatively low. The group which has less coefficient of variation is said to be more stable. The coefficient of variation of other variables such as deposits, advances, investments and total business is high. A high coefficient of variation indicates less consistency or less homogeneity. (Kumar, Mohan,& Singh, 2012)

It is found that branch expansion, deposits, advances, investments, and business performance are positively correlated with other variables, whereas employee recruitments negatively correlated to all other variables. It shows that even with a decline in some employees, the business performance of nationalized banks is not affected. Public sector banks are required to perform all types of non-productive work such as payment of pension, old age pension, MANREGA payment, teacher salary payment, tax collection, selling of gold, mutual fund, and insurance products, etc. which private sector banks are not doing. It is Public Sector Banks which have to shoulder the responsibility of target for financial inclusion fixed by the government. While we have often heard of people leaving banks to join finance, legal, accounting firms. As it is observed that some employees in the banking business are not growing at the rate with which bank work is increasing, such as with the change in any policy

be replaced. Depending upon the productivity growth, the industry will need 2.5– 4.5 lakh additional people for growth in business.(Kawad & Patidar, 2014)

suddenly banks are imposed with ample task within stipulated timeline. It always requires preparedness for banks and their employees to tackle the increased work pressure.

4. Career planning

Almost last five decades, a career in banking has been one of the preferred choices for many aspirants. Seldom anyone heard that bank officials are making a move from banking business to some other industry, this phenomenon is common especially in private sector banks but for public sector banks so far due to the stability of job employees attrition was not that high. The extreme work culture volatility and change in job roles now create palpitation among employees to switch from one bank to other or maybe from one business to another.

The financial services industry has been undergoing a technology revolution. Apart from banking, the job market provides various other lucrative opportunities in financial services. There is a growing desire among the millennial to work for the new startup financial services firms. There are also cases of executives in the middle or senior level management leave their banking career and starting their ventures. The emphasis on financial inclusion of government of India has made RBI give new banking licenses to corporates. Banks must address the threat of employee attrition through a structured approach for career planning.

a) Career Progression

One of the weakest links in the HR policies of PSBs today is career planning, which was attributed to a lack of focused attention to groom and prepare people as part of a planned strategy to build careers. That promotion is the 'be all and end all' of the development process is a general notion that seems to prevail. (Henry, 2014)

Policy in force for several years had built in rigidity in the matter of minimum length of service required to be put in by an officer in a particular scale for becoming eligible for promotion to the next higher Scale. It took as many as 17 years for an officer in Scale I to become a chief manager (Scale IV) and another eight years to become a general manager (Scale VII), which has resulted in an extremely adverse age profile of both executives and senior officers. (Ivrendi & Guloglu, 2013)

The career progression can be ensured if the bank can develop this culture within the system. On the one hand, it is necessary to provide career development opportunities for every employee in the bank; it is also fundamental to track star performers as well as high potential employees whether in clerical cadre, officer cadre or executive cadre. HR should develop mechanisms for tracking down such employees and provide opportunities supported by right

training. In the absence of a sound mechanism for monitoring of the performance of this star, performers are also critical for career planning to succeed (Rani & Garg, 2014).

b) Planning during job reduction

Robotics, automation, and software can replace any job role might seem obvious to anyone who's worked in automotive, manufacturing or service industry. Rapid technological change has been destroying jobs faster than its creation. This fact contributes to the stagnation of median income and the growth of inequality in the various developed and developing economies. In economics, for productivity development one of the crucial indicators is labor hour which is measured by the amount of economic value created for a given unit of input, such as an hour of labor. It is a crucial indicator of growth and wealth creation, which precisely measure the progress of the economy. The study revealed that as businesses generated more value from their workers, the country as a whole became more affluent, which fueled more economic activity and created even more jobs. Further, in few years, it was observed that productivity continues to rise robustly, but employment suddenly wilts and a significant gap appears between the two lines, showing economic growth with no parallel increase in job creation. Brynjolfsson and McAfee concluded and addressed the reason behind the phenomenon of great decoupling between economic growth and productivity is technology. It also works behind both the healthy growth in productivity and the weak growth in jobs.

Now since the technology developments are emphasizing advancements in technology simultaneously, it helps to reduce labor cost due to a decrease in workforce. The concept of job innovation or doing career planning during job reduction duration is a significant challenge for the banking workforce. Now the question arises that whether the employees are motivated enough during layoffs or whether they are well prepared enough to switch to other business or role during the time. Since during working hours the employees hardly get any time to explore any further.

5. Performance management Support (PMS) from Bank Management

The bank's growth heavily depends upon the performance of employees involved in the banking business. The effective employee performance has a direct effect on banks growth; banks have experienced this phenomenon on various occasions. The bank should carefully monitor the employee performance since lagging which bank may suffer from significant

consequences such as frauds, business degrowth. The growth of technology act as a platform to bring transparency in performance appraisal. The performance measurement is active with the advent of technology. The examples which highlight this phenomenon is like every minute accuracy of employee performance such as telephone interaction with the customers; the time is taken to clear deposits, issue of demand drafts, sanctioning loans, can be measured accurately through appropriate software. It is possible for banks to follow a structured approach for performance appraisal where the expected outcomes and critical performance skills are identified.

a) **PMS based on Transparency**

Performance Management System (PMS) is the backbone of any organization, as it is a performance that helps it to grow, develop and strive for excellence. It is the only system that ensures that human capital is adequately utilized and encouraged to achieve business results. It is also the primary tool to ensure that individual and organizational goals are aligned. It is the only way to ensure that seniors understand their juniors' needs to guide them in their plans and enable them to deliver results. (Ahmad & Skully, 2007)

Performance appraisal system, as obtaining today, is confined to some specific workgroups such as officers and executives in most banks. Workmen staff constituting a significant part of the total workforce is not today covered by the system in most banks. In banks where it covers the workmen staff, inputs from the appraisal are not adequately reckoned for promotions and placements. In the Committee's view, every employee of the organization, irrespective of his cadre, will have to be brought under the performance review process to create a high-performance culture across the organization.

b) **Reward management- KRA's**

Another critical perspective for banks performance management system is critical reward areas. Under which any incentive scheme should be to promote a high-performance culture through continuously raising the bar of the performance of the organization, not only regarding quantifiable business parameters but equally, regarding improvement in qualitative aspects of productivity and efficiency. Employees making an outstanding contribution through their performance towards these objectives should only be entitled to receive the performance-linked incentive. In its very nature, incentive, therefore, is not meant for distribution across all sections of employees but should be directly related to performance. Banks would thus be required to

install and implement a reliable and credible PMS for effective implementation of the scheme and to avoid discontent in the more extensive section of performers (Moschetto, 2014)

6. Training Exposure

Effective implementation of technology can only be visualized if suitable and applicable training to be provided to all employees which linked to banking business. The training needs arising from the upcoming business requirements and capabilities are essential to address such prerequisites. The technology disruption under the protection of regulatory and reforms would demand the need for training on the great urgency to all banks. Banks focus on training and re-training of employees parallel, where the first employee needs to unlearn the old skills and acquire new skills.

The Challenge that banks need to dazed to cover their employees is their suitability for training & development. In fact, training and development remain one of the most slandered aspects of HR administration in banks. It was observed absolute indifference, in way employees are sent for preparation. Neither there is a serious effort made to measure the usefulness of training for the employee nor there any application which can map the training needs of the individuals by their core competencies or placement.

a) Training needs

Another vital area about training is interactive features and the duration while these interactions are required. The same can be ensured via attitude, gestures and work profile. While authors closely monitored than through first discussion, it reveals that behavioral training focuses on exploring the unknown and hidden potential of our human resource, which usually called as human capital. With most of the banks now exposed to contemporary technology, such as innovative distribution channels; advance products and instruments, now technology no longer remains a significant differentiator among banks. The innovations in this arena create a scenario in which bank must remember that the risky differentiator in the banks in the decade ahead will be the aptitude to connect the human capital and building a competitive advantage on the strength of their human resources. To be on pace with this advancement bank needs o to understand the training needs of employees and so as a business to develop a win-win situation scenario.

b) Training Support

In a service-oriented industry like banking, the quality of human resources has to be the central concern. Unless the organizations influence the strength of their workforce to the maximum, they will fail miserably in reaching a competitive edge in the global banking arena, which makes the role of the CMD and Board very vital. The HR policy needs to be strategically aligned and connected with the business. Given the criticality of HR issues, they need to be debated at board level. Boards of banks need to spend quality time on formulation and deliberation of strategies involving leadership development, succession planning for critical levels and specialized areas, performance standards, compensation and rewards management, redesign of organization structure. The banks need to have a strategy which invocates out the short term and long term HR agenda. The management of the banks should lead and support the HR roles to reduce people's concerns and simultaneously seek higher levels of productivity and performance. They should also frame policies which help them manage the expectations of their staff, whether at the lower level or the middle management level.

c) Training Effectiveness

(Donald L. Kirkpatrick, 1997), Evaluation, Training, and Development Handbook approached its, evaluation process more logically. The author emphasized that while evaluating training, instead of just studying the reactions of the trainees, the study could be carried out in four different levels viz., i.e., reaction, learning, behavior, and results. The author's guidelines and discussions on each level of evaluation of training are worth mentioning. (Jane Richards, 1997), Management Training-the Real Objectives views that while embarking upon a management programme, the real objective must be to focus on the individual manager, not the position in the company. The author's discussion on training needs analysis, i.e., about core competencies, job profiling and identification of competencies gaps-either against core competencies for individuals or against job profiles for generic roles is worth mentioning. (Niki Glaveli; Stella Kudu , 2005), in their paper analyzed the changes that took place in the Greek banking industry. Authors have analyzed the impact on the role of employees training and development for strategy implementation and success, using four case studies to investigate the effect of the environmental changes on these particular banks and the role of these training and development strategies to the changing industry environment. (Riyaz Rainaye, 2004), in their study empirically examined the training policy in two commercial banks, namely, State Bank of India and Jammu & Kashmir Bank Limited. The focus is on the various facets of training including

Management's attitude towards training, training inputs, quality of training programmes and transfer of training to the job.

Every organization needs to have well-trained and experienced people to perform the activities that have to be done. As jobs have become more complicated in the banking sector, the importance of employee training has increased. In a rapidly changing society, employee training is not only an activity that is desirable but also an activity that an organization must commit resources to if it is to maintain a viable and knowledgeable workforce. In the dynamics of the banking business, HR department should care for appropriate response in equipping people who have to perform in the new environment. When the effectiveness of training increases it directly has a positive influence on growth & result of the banks. So training is adequate in all the banks that are taken for this study. In the banking sector, employee's behavior plays a vital role in improving the productivity of an organization. By incorporating personality development programmes such as role play, group discussion and business games the superior and subordinate relationship can be strengthened. Banks should take necessary steps in such a way that employees should feel training is essential to enhance the productivity and customer satisfaction to meet the present business challenges in India.

7. Time for Skill Transformation

The skill sets of banks are classified into general skills and specific skills. The general functions include a banker and other administrative activities. The specific skills include IT, legal, compliance. The specific functions in general and IT, in particular, has been going through tremendous changes due to change in the external environment. The shelf-life of any new technology is getting shorter and shorter as the time progresses. The competitive ability of banks depends on the skill sets of its employees.

a) Skill up-gradation

Under skill up, gradation banking business has to face numerous challenge related to the adaptability of human resource. The advent of IT has shifted the traditional banking into technology-driven modern banking. The abrupt implementation of technology-enabled processes such as Core banking solution, Internet and mobile banking and branchless banking has created the need for specific IT skills. As a repercussion, it has created a skill gap among the employees especially the traditionalists, baby boomers, and Gen x to some extent (Cheung & Kaymak, 2008). The transmutation from vanilla banking to multispecialty banking has

necessitated the need for newer skills like corporate credit, risk management, Investment banking. Skills in new areas like Infrastructure Financing, Financial Inclusion, are also required in the evolving context (Ciutiene & Railaite, 2015). These gaps would need to be systematically bridged and strengthened. Developing talent pool for different areas of skills will thus be the main agenda for the training systems of banks. In the context of new developments in banking services, banks must explore the feasibility of providing continuing education to their employees (Correa & Raju, 2008).

With banking products becoming increasingly sophisticated and new business models emerging, PSBs would be required to recruit and use a large number of specialists in a variety of areas like Risk Management, IT, HR, Treasury, Forex. Acquiring and retaining such specialist resource will be a significant challenge for the PSBs. Banks today need a 'digital workforce' to converge diverse platforms like mobile solutions, social media, biometrics., to render seamless and highly customized banking services. (Correa & Raju, 2008)

Through training is one of the means to address skill gaps, the classroom training only provides an opportunity to train a limited number of employees. Since banks recruit candidates in large numbers, alternative modes of training like e-learning may be explored. (Rani & Garg, 2014). Today, between 60 and 65 percent of employees are older than 40, with millennials accounting for a majority of the remainder. In three to five years, those percentages will flip. Banks are digitizing training programs, to retain knowledge walking out the door.

b) Skill Development

Central Bank of India, a leading public sector lender, has launched a first-of-its-kind CENT Skill Development Loan Programme to provide financing for trainees pursuing skill development and vocational training with partners of the National Skill Development Corporation (NSDC). Talent Sprint, an emerging leader in professional skill development and employability for the IT and BFSI sectors, will be the first to implement this Loan Programme.[16]

NSDC, a public-private partnership company set up under the aegis of the Ministry of Finance, aims to make a significant contribution to the overall target of skilling and upskilling 500 million people in India by 2022 mainly by fostering private sector initiatives in skill

[16] https://www.talentsprint.com/newsroom/central-bank-india-launches-cent-skill-development-loan-talentsprint-and-other-nsdc-partner

development programmes and providing viability gap funding. The first beneficiaries of the CENT Skill Development Loan are the trainees at TalentSprint. In a short span of two years, TalentSprint has successfully skilled over 1500 unemployed college graduates in technology, domain, and business communications, enabling them to get their first jobs at salaries ranging from Rs. 1.5 to Rs. 3.2 lacs per annum.

Speaking at the press conference, Mr. S. Sridhar, Chairman and Managing Director of Central Bank of India said, “There is a huge shortage of skilled workforce in India, across all sectors of the economy. Through this newly created scheme, we will be able to finance our youth who need skills that will help them get jobs and become contributing members of the society. NSDC is selecting and funding credible organizations, and we intend to support TalentSprint and other NSDC partners as they undertake the mission of skill development across the country."

8. Employee Compensation

Finding skilled, experienced, responsible employees is a challenge for human resource departments in any industry, more so in a service-oriented industry like banking. The primary task of the HR policy of banks is to create a favorable atmosphere where people get the opportunity to showcase their potential and receive adequate compensation. The inadequacy of compensation is made out as an issue in the PSBs, which encourages attrition. Authors have done a comparative analysis of the staff compensation in the public sector bank employees is more than that of the private sector bank employees in this country. Add to that, the job security in a public sector and the scale tilts decisively in favor of the public sector. I think the challenge for the HR heads of PSBs is to percolate this message down to the lower levels. It will help in tackling the challenge of staff attrition and improve employee morale.

A related issue that authors want to raise is why public sector banks still conclude industry-level wage settlements instead at the individual bank level. Some of the banks have precarious financial conditions, and if forced to give a raise at par with other banks, that would severely constrain their ability to do business going forward. Therefore, in the long-term interest of the banks, it is necessary that each bank revise the wages of its employees as per its ability to pay. Further, why the PSBs cannot even do employee wise negotiations on salary hike as in the private sector; which would be a motivating factor for the performers?

a) **Differential salary structure**

The recruitment policy of the banks should be oriented towards having a right-sized and right-skilled workforce in tune with their medium to long-term business plans. For instance, in line with the national emphasis on financial inclusion and spreading banking services to unbanked remote areas, it may be necessary to bring in specialists who know agricultural operations, agricultural finance and are willing to work in rural areas. In this context, the authors wish to raise a debatable issue. Should the PSB Boards not consider appointing employees who would be willing to serve in the rural areas at lower wages? It is high time the PSB banks created a differential wage structure for the employees serving in various areas. The spin-off benefit of this would be regarding the increased viability of their rural business and increased financial inclusion.

9. Compensation to meet Advancements/ skill Incentives

The digital era is going to transform the conventional banking into modern banking. It is expected to create new job roles and skills. The shift from conventional to technology-enabled alternate delivery channels and innovative financial services are expected to create new job roles. Such roles demand more technical skills as compared to the skill requirement for general functions in banks. In future banks need to redefine their recruitment skills to address the skill requirement.

The organization structure on banks has four layers, i.e., Junior Management, Middle Management, Senior Management, and Top Management. At a lower level, the staffs are recruited as Clerks and Probationary officers. The clerks and officers recruitment carried out through separate examination. Now the advent of technology has rendered the administrative functions redundant. The public sector banks recruitment more clerks at the junior level, whereas private sector banks have changed their hiring trends. There is a wide disparity between the ratio of clerks and officers between the public sector and private sector banks. Private sectors have more officers than clerks as compared to Public sector banks of the 1.15 million employed by the scheduled commercial banks in 2013-14, more than 600,000 were officers.

In private banks, only 21 percent of the nearly 300,000 employees fall into the category of clerks. Foreign banks, with only 6 percent clerks among their ranks, have always preferred to hire more officers. All the 42,420 people who worked for the third-largest private sector bank in the country in 2013-14 were designated as officers. Kotak Mahindra Bank and Yes Bank are

some of the other leading banks that had a similar employee profile. An exception is ICICI Bank, the largest private bank, where nearly 55 percent of employees were clerks in 2013-14.

However, the country's largest bank, State Bank of India (SBI), still has more clerks than officers on its rolls. Nearly half of the bank's approximately 200,000 employees are categorized as clerks, according to the latest data with the Reserve Bank of India, or RBI. However, even that represents a significant change. This skew means that the entire banking system in India is now biased towards officers.

The change in the employee profile has been necessitated by the computerization of the banking system, which has rendered administrative functions almost redundant. "Earlier, clerks would make entry and officers would check and authorize transactions. It was known as the maker-checker model," explains a PSU bank official. "Now that most of the banking system is computerized, there is no need to check transactions manually." In 2010 Clerical staff constituted single most substantial cadre in the total workforce (42%) of PSBs. In the post-CBS environment in banks, the borderline between the job of an officer and a clerk is rapidly disappearing.

Critical Issues of compensation in the Indian Banking System

1. In India, the pay scales between public and private sector banks are uneven. Some of the private sector banks CEO receive 30 times more than the counterparts in public sector banks. The pay scales in middle-level managers are higher than the private sector banks. An entry-level officer's salary in a Public sector bank is 50 % more than the private sector bank. The pay scales are higher in the public sector banks only up to a particular grade. Private sector banks score high for salaries paid to the top level officers.
2. Eleven public sector[17] banks have signed MOU with the Government of India for Capital infusion. The agreement mandates the banks to reduce their overall cost by 25% without changing the employee benefits.

[17] Allahabad Bank, Andhra Bank, Bank of India, Bank of Maharashtra, Central Bank of India, Dena Bank, IDBI Bank, Indian Overseas Bank, UCO Bank, United Bank of India and Union Bank of India.

3. The cost to income ratio which is measured as a difference the interest earned and interest expanded with operating expenses show a disparity between public and private sector banks. The cost to income ratio for public sector banks is 58% in 2016 as against 41 % for private sector banks.
4. The employee cost measured as a percentage of operating expenses shows a significant gap between public and private sector banks. For PSU banks, the average employee expense on the total operating expense by 58% during 2017 and 39.35% for private sector banks. The ratio varies between 42.86 % and 68.38% for PSU banks. The range is between 31.82% and 66.26% for private banks.

10. Competency Building Strategy

Technology is at the forefront of every financial service. Whether it is fund transfer, payment of bills, applying and sanctioning of the loan and other retail and corporate services. The electronic devices are expected to dominate humans in delivering services to the customers. Banks will have the capability to process an enormous volume of transactions in a fraction of time. While these advancements would undoubtedly facilitate banks to provide value-added services, empathy is needed to resolve customer complaints. Modern technology and new services bring the necessity for banks to train their employees to handle the customer complaints effectively.

(Singh, 2006) Discusses customer management in banks. As such, the management aims to target the customer to gain customer insight and provide value-added products and services. Technology has enabled the banks to reach customers in any part of the world at any time with customized products, thereby moving towards the concept of customer satisfaction. Management must strive to deliver a positive experience (proper service delivery) to each customer; and as such, this may be functional, emotional or situational for long-term customers and business management in the banks.

The Banking Ombudsman (BO) handled 75,183 complaints during 2012-13, which include 4,642 complaints brought from the previous year. Out of the total 75,183, it found 56% or 39,400 complaints maintainable. However, even in maintainable complaints, it rejected almost 49% or 19,205 complaints while passing awards in just 1% or 312 cases and resolved 50% or

19,833 through mutual settlement, which also highlights the need to have certain norms that can make bank staff accountable for the suffering of customers. [18]

A large volume of complaints on this ground indicates a lack of awareness about these Codes among bank staff as also the customers. Banks need to devote particular attention to this aspect and provide ongoing training to their staff on the Codes," the report said.

These days it is all about the customer experience, and many banks are feeling pressure because they are not delivering the level of service that consumers are demanding, especially in regards to technology. Meeting customer expectation with the advent of technology is also a challenge which is observed in due course of time. During our discussion with bank officials, it was observed that to handle different segments of customers those who are tech-savvy and also who are purely novice in this area is a challenge for banking workforce so that banking business should also not get affected.

Customers have become demanding, and the loyalties are diffused. There are multiple choices; the wallet share is reduced per bank with demand for flexibility and customization. Given the relatively low switching costs; customer retention calls for customized service and hassle-free, perfect service delivery.[19]

5.3 Validation of Identified Challenges

Validation of identified workforce challenges is based on a semi-structured questionnaire and one to one discussion with senior officials of the bank as a manager, employees in the area of technology and access to research reports. The responses were considered as per dichotomous responses; all positive and negative responses were counted. A pilot study is conducted by collecting response from 55 officials. Z score is used to validate the challenges.

Z score formula mentioned in equation 4.1.

$$z_{score} = \frac{p - P}{\sqrt{\frac{pq}{N}}} - - - - - - - - - - (5.1)$$

Where p-possibility of getting a result (0.8);

q- Possibility of not getting a result (0.2);

[18] http://www.moneylife.in/article/banking-ombudsman-customers-continue-to-get-the-short-shrift-in-fy13/36325.html

[19] https://sol.du.ac.in/mod/book/view.php?id=1225&chapterid=865

P- Respondents responded/total sample;

N- Sample Size (55) (Hofstede, G.; 2008)

Using $\mathbf{Z_{score}}$ t,he acceptance & rejection criterion is validated. The values lie in the range between +3 to -3

TABLE 5.1: Z SCORE FOR IDENTIFIED WORKFORCE CHALLENGES

Assessment Factor	Assessment variables	Z score	Accept/ Reject
Employee Compensations to meet advancements	Increase in Employee cost	3.7081	Accept
Training Exposure	Training Effectiveness	3.7081	Accept
	Training Needs	3.7081	Accept
	Training Support	2.0226	Accept
	Meeting Customer Needs	3.7081	Accept
Work Management	Work Efficiency	1.3484	Accept
	Work-Life Balance	2.0226	Accept
Employee Adaptability to change	Adequacy	3.0339	Accept
	Preparedness	0.6742	Accept
Compensation Management	Structured Approach For Recruitment Planning	2.0226	Accept
Career Planning	Career Progression	0.6742	Accept
	Job Reduction	1.6855	Accept
Performance Management	Transparency	2.5200	Accept
	KRA's	2.6968	Accept
Skill Deficiency	Skill Deficiency	3.0339	Accept
Skill Transformation	Skill Up gradation	2.0226	Accept
	Skill Development	3.0339	Accept
Competency	Competency Building strategy	3.375	Accept

TABLE 5.1: Z SCORE VALUES OF WORKFORCE CHALLENGING FACTORS

The challenge variables which come out from the study has been validated using Z_{score} values which lie between -3 to +3 values, and the result is validated using table5.2. Total ten workforce challenges were identified and validated with few challenges comprises sub sections.(figure 5.2)

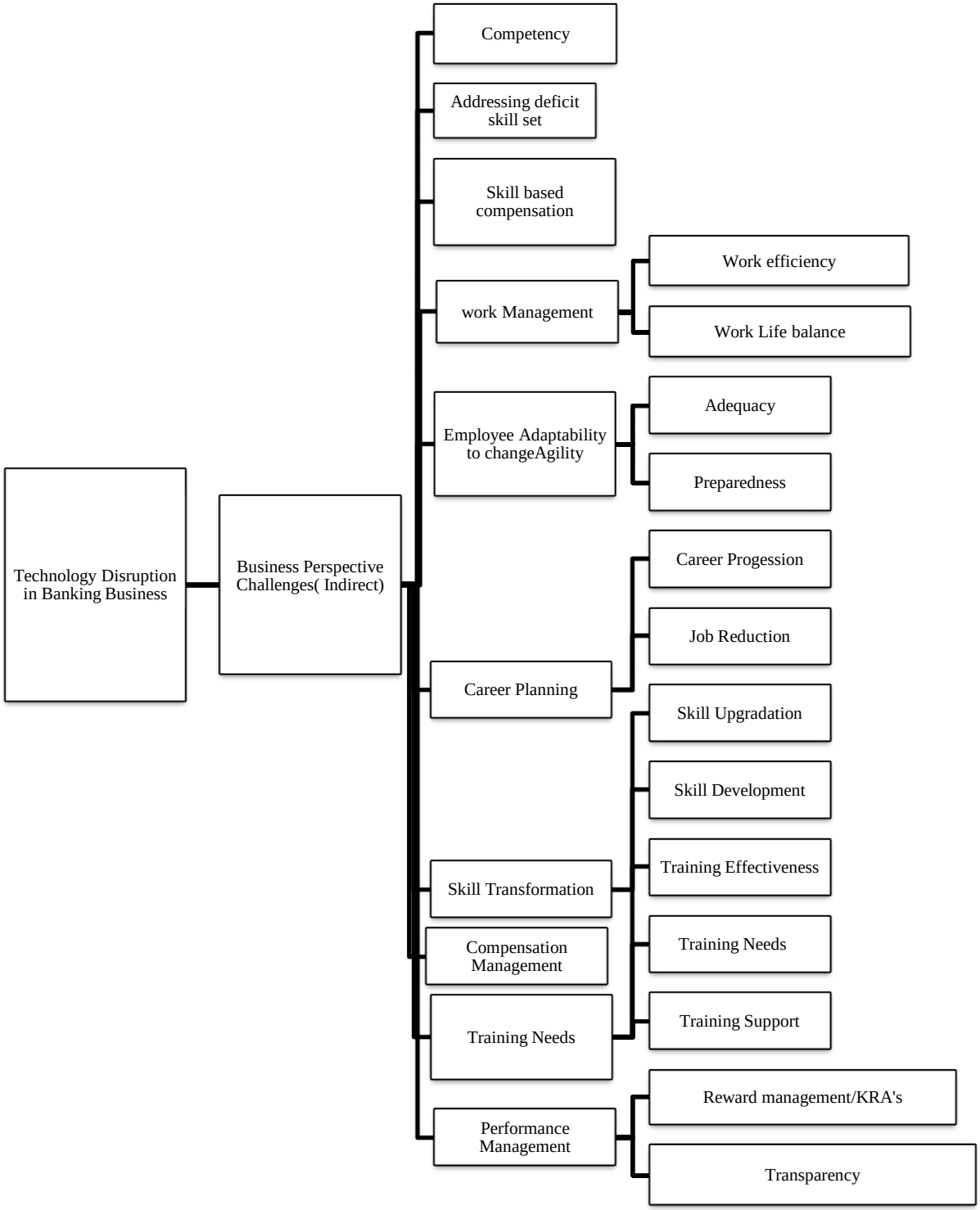

FIGURE5.2: WORKFORCE CHALLENGES IDENTIFICATION IN INDIAN BANKS

5.4 Chapter Summary

The chapter summarizes the workforce challenges derived from technical disruptions leads to having an impact on the banking business. Total 15 significant factors were identified in which some has sub-variables also. After validating all these major ten factors for Indian banking perspective, the outcome of the result is confined all significant factors comprising few sub-variables. The validation was based on expert opinion and focused group discussion with senior banking officials across India from numerous public and private sector banks. The upcoming chapter will highlight that accurate impact assessment if identified challenges using Fuzzy logic theory.

CHAPTER 6

WORKFORCE CHALLENGE ASSESSMENT AND ESTIMATION OF INDEX

6.0 Introduction

The primary objective of this research is to analyze workforce challenges of Indian banking system due to technological disruptions. Simultaneously this study also segregates challenge factors for both public and private sector banks. The relative importance of challenging factors are identified and at the end workforce challenge index (WCI) is estimated. The WCI index forms the fundamental basis for informed decision-making related to addressing the challenges. However, a probability model built upon classic set theory may not be able to describe some challenges in a meaningful and practical way. Lack of appropriate data entangled cause-and-effect relationships and imprecise data make it difficult to assess the degree of exposure to a specific challenge in traditional probability model.

Sometimes, even with a credible quantitative risk model calibrated to experience data, the cause of the challenge and its characteristics may be incompletely understood. Apart from stochastic variables, some external variables that are not stochastic may also influence workforce challenges. Other models, such as fuzzy logic, hidden Markov, decision tree models, artificial neural and Bayesian networks, explicitly consider the underlying cause-and-effect relationships and recognize the unknown complexity. These newer models might do a better job to understand and assess specific challenges, such as the workforce challenges. On the other hand, with appropriate challenge identification and challenge control in place, operational lacuna's can be significantly mitigated. Therefore, it may be beneficial to build and implement more models using fuzzy logic to assess the workforce challenge.

The factors creating challenges are identified based on literature reviews, expert interviews, and field survey. The relative importance of these factors is evaluated strategically and ranked accordingly. This chapter focuses on the use of fuzzy logic, introduced by mathematician Lotfi A. Zadeh in 1965, (Jenab & Ahi, 2010) to create an index. Unlike probability theory, fuzzy logic theory explicitly quantifies the challenges. Fuzzy logic model is more convenient for incorporating expert opinions and more adapted to cases with insufficient and imprecise data. Using approximation and making inferences from ambiguous knowledge and data, fuzzy logic models may be used for modeling challenges that are difficult to understand. Some

operational and emerging challenges evolve quickly. The decision makers may not have complete knowledge about the intensity of all business challenges due to lack of quantification. Fuzzy logic models can be instrumental in assessing a business enterprise's exposure to these challenges.

6.1 Identification of workforce challenges.

An extensive literature review has been carried out to identify the current challenges of the Indian banking system. Those challenges are categorized into the business, operational and workforce-related challenges. Since the scope of the study is on workforce challenges, the researchers attempted to quantify only the challenges related to the workforce. This study conducted an expert opinion survey to identify the challenges, which are more specific to the workforce caused by technology disruption. Post survey and literature review, ten challenging factors are considered for public and private sector banks of India.

The challenges identified from the literature review (Detailed in Chapter 2& 5) & expert opinion are performance management, career planning, recruitment planning, employee cost, competition management, organizational agility, work management, complaint management, compliance management, cybersecurity, training exposure, and skill deficiency. Challenge Factor (F) for banks are denominated as Subsets of $\boldsymbol{F_{wc}}$. Formed based on the following listed challenge variables as mentioned in Equation 6**.1**.

$$\boldsymbol{F_{WC}} = (\textbf{performance management}, \textbf{career planning}, \textbf{Competency}, \textbf{employee compensation}, \textbf{Employee Adaptability to change}, \textbf{work management}, \textbf{deficit skills}, \textbf{training needs set} \ \boldsymbol{skill\ based\ compensation}, \boldsymbol{skill\ transformation}\ \mathbf{6.1}$$

All challenge variables were scaled on the scale of **1-5** where **1 is very low and 5 for extreme**. Experts opinion in and focus group discussion helped to cover all challenge factors into in the scale and based on their opinion the appropriate someone has been defined. The he focus is only on those challenges that are measurable, all attributes are explained in table 6.1.

The scores of attributes for a particular challenge is illustrated in challenge identification score histograms. Y-axis represents the Challenging Factors, and corresponding scores are on the X-Axis.

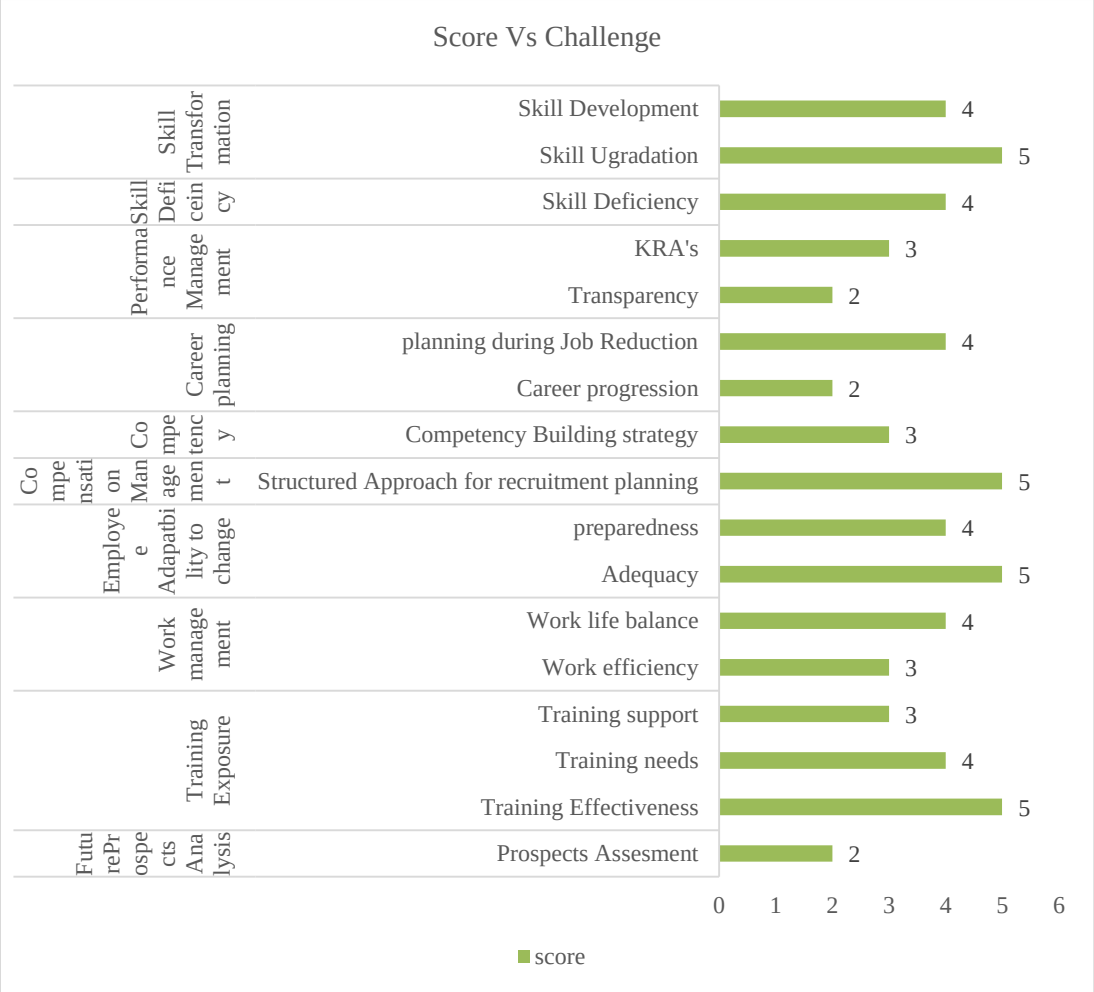

FIGURE6.1: SCORE ALLOCATION TO IDENTIFIED WORKFORCE CHALLENGES

6.2 Questionnaire survey

All challenges are assigned a weight based on the relative importance and severity. For example, performance management was expected to have less weight than training needs. Questionnaires framed based on expert opinion and literature review were floated among bank Officials, managers, clerical staff and retired employees in Indian public and private sector banks. The details of the questionnaire and the weights of parameters are explained in methodology and Annexure III.

The survey was conducted by sending a questionnaire through emails to respondents and also floated through linked-in group email id's. Inputs were also solicited based on face to face interview with bank officials, employees and retired officials. Each respondent was asked to mention the importance of challenges on a five scale for each parameter. Rating one means less importance whereas rating five means more importance. The total number of ticks for attributes of each parameter can be seen in Table 5; the same was used in the calculation of weights of the challenging parameters for banking sectors. A detailed rationale of the questionnaire survey

is explained in Chapter 3. This section explains only methodological contributions of the surveys. The following are the methods applied to calculate relative weights of parameters.

1. The number of ticks for each challenge in the public survey were counted. One to five attributes were taken into consideration in the calculation of overall weighted averages of parameters to promote precise preferences.
2. Each challenge had a significance grades $\mathbf{g_i}$ that demonstrates the significance of the feature compared to the others challenges, here, in this case, each parameter significance considered to be same, so significance grade comes out as 1/**10**.
3. Weights of Challenges were obtained by multiplying overall weighted averages with significance grades.
4. Weights of challenges were normalized and final weights of parameters **(W_r)** were used in the fuzzy logic application.

The calculation of weights of risk parameters is described in Table 6.1 from questionnaire survey responses.

TABLE 6.1: TECHNOLOGY RELATED WORKFORCE CHALLENGES ASSESSMENT

Assessment Factor	Assessment variables	no of 1s	no of 2s	no of 3s	no of 2s	no of 5	Total Respondents	Weighted Sum	Weighted Average(WA)	Rating (RI)	Weight (w)=Rating RI)*weighted average (WA)	Normalized Weights	cumulative Factor Weight
Compensation to meet advancements	**skill based compensation**	24	124	131	203	153	635	1836	2.891	0.1	0.289	12.18%	12.18%
Training Exposure	**Training Effectiveness**	165	268	106	70	26	635	1289	2.03	0.033	0.068	2.85%	9.53%
	Training needs	123	150	250	74	38	635	1511	2.38	0.033	0.079	3.34%	
	Training support	91	230	171	90	53	635	1509	2.376	0.033	0.079	3.34%	
Work management	**Work efficiency**	242	266	81	39	0	635	1095	1.744	0.05	0.087	3.67%	8.27%
	Work life balance	171	180	130	101	53	635	1388	2.186	0.05	0.109	4.60%	
Employee Adaptability to change	**Adequacy**	112	211	189	106	17	635	1398	2.202	0.05	0.11	4.64%	10.56%
	Preparedness	27	128	185	176	119	635	1785	2.811	0.05	0.141	5.92%	
Compensation Management	**Structured Approach for recruitment planning**	120	174	123	167	51	635	1426	2.246	0.1	0.225	9.46%	9.46%
Skill Deficiency	**Skill Development**	99	179	189	111	57	635	1531	2.411	0.1	0.241	10.15%	10.15%
Career planning	**Career progression**	19	57	68	309	182	635	1865	2.937	0.05	0.147	6.18%	12.01%

	planning during Job Reduction	38	71	80	298	148	635	1756	2.765	0.05	0.138	5.82%	
Performance Management	**Transparency**	153	193	136	78	68	628	1443	2.298	0.05	0.115	4.84%	9.32%
	KRA's	157	288	111	37	42	635	1350	2.126	0.05	0.106	4.48%	
Competency	**Competency Building strategy**	130	283	142	43	37	635	1393	2.194	0.1	0.219	9.24%	9.24%
Skill Transformation	**Skill Ugradation**	100	271	126	94	44	635	1428	2.249	0.05	0.112	4.74%	9.30%
	Skill Development	139	261	139	61	35	635	1375	2.165	0.05	0.108	4.56%	
											2.374	100.00%	

The relative importance of workforce challenging factors for banks is plotted in the figure. 6.2, Where X-axis shows the relative importance, and Y-axis shows the challenge.

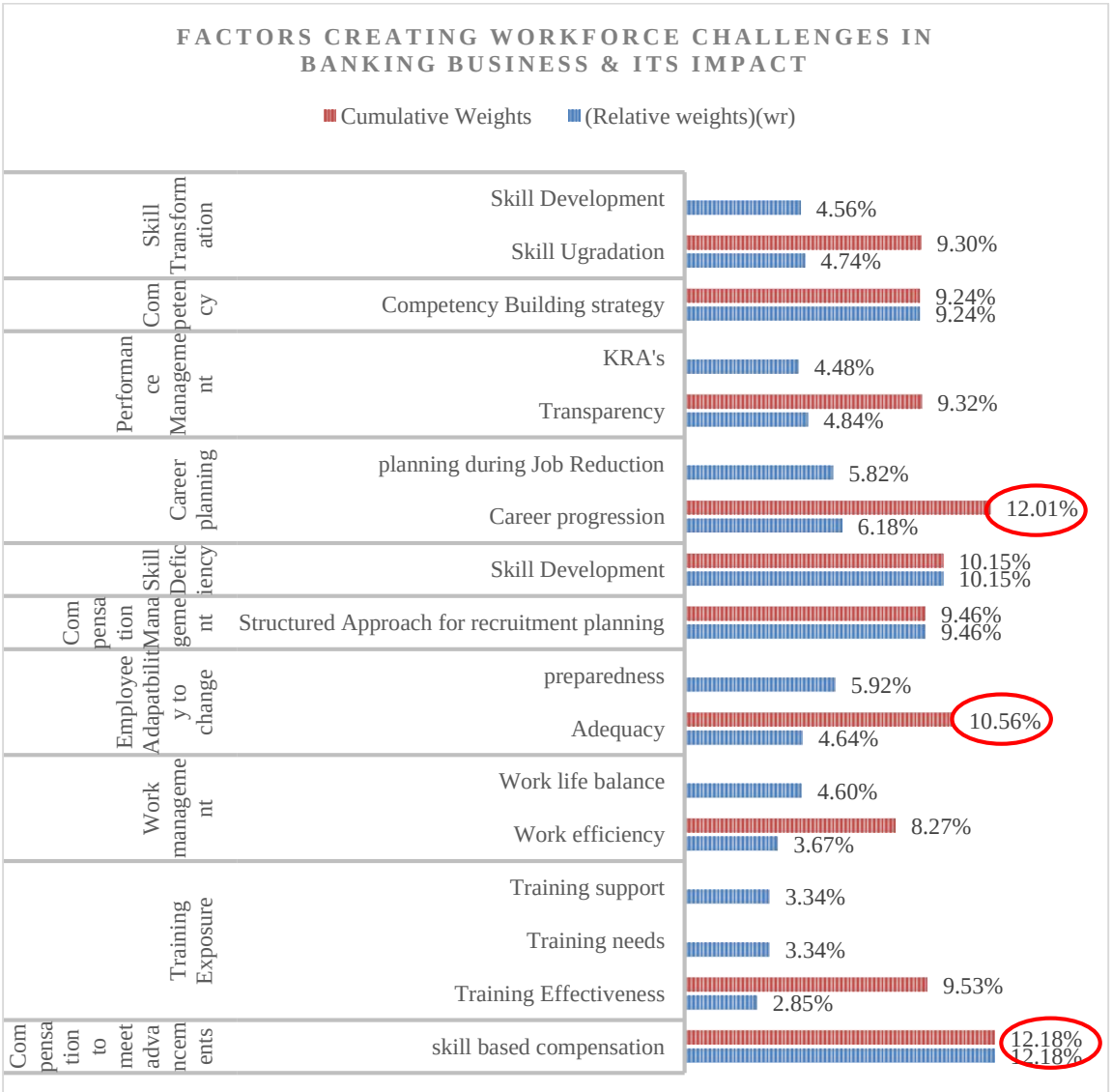

FIGURE 6.2: RELATIVE WEIGHTS OF VARIOUS WORKFORCE CHALLENGES IN INDIAN BANKING BUSINESS

TABLE 6.2: WORKFORCE CHALLENGE INDEX ESTIMATION

Assessment Factor	**Assessment variables**	(Relative weights)(wr)	Cumulative Weights	**score**	Unity Matrix					**AF=I * RF**	AF matrix					**MD= w_r* AF**	**Membership Degree Matrix (MD)**				
					1	2	**3**	4	5		1	2	**3**	2	5		**1**	**2**	**3**	**2**	**5**
Compensation to meet advancements	**skill based compensation**	**12.18%**	**12.18%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.0974	0.1218	0.0609	0.0244	0.0000
Training Exposure	**Training Effectiveness**	**2.85%**	**9.53%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0057	0.0114	0.0285
	Training needs	**3.34%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0200	0.0334	0.0134
	Training support	**3.34%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0167	0.0334	0.0167	0.0000
Work management	**Work efficiency**	**3.67%**	**8.27%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0110	0.0367	0.0257	0.0000
	Work-life balance	**4.60%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0414	0.0460	0.0046
Employee Adaptability to change	**Adequacy**	**4.64%**	**10.52%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0278	0.0464
	preparedness	**5.92%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0118	0.0296	0.0592	0.0000
Compensation Management	**Structured Approach for recruitment planning**	**9.46%**	**9.46%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0378	0.0946
Skill Deficiency	**Skill Development**	**10.15%**	**10.15%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0609	0.1015	0.0711	0.0000
Career planning	**Career progression**	**6.18%**	**12.01%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0247	0.0618	0.0309	0.0000	0.0000
	planning during Job Reduction	**5.82%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0349	0.0582	0.0291
Performance Management	**Transparency**	**4.84%**	**9.32%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0290	0.0484	0.0242	0.0000	0.0000
	KRA's	**4.48%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0358	0.0448	0.0269	0.0000
Competency	**Competency Building strategy**	**9.24%**	**9.24%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0462	0.0924	0.0554
Skill Transformation	**Skill Ugradation**	**4.74%**	**9.30%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0426	0.0474
	Skill Development	**4.56%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0182	0.0456	0.0137
																	0.0148	0.0304	0.0361	0.0367	0.0194
																	0.0226	0.0333	0.0364	0.0281	0.1203
																	A12	A23	A34	A45	AT
																	0.2545				
																	2.1145=WCI				

The most prominent workforce challenges are identified as compensation, employee adaptability to change and career planning based relative weights. Once relative weights were estimated as discussed in methodology section using various matrices were framed and, which discussed in previous chapter for workforce challenge index estimation using member ship degree matrix, Table 6.2. All unity matrix, risk fuzzy matrix has been designed and finally through process assessment fuzzy matrix and membership degree matrix is computed. Membership degrees are final assessment matrix of attributes (from 1 to 5) for a specific project type. The membership degree of attributes for a particular bank can be plotted in attributes vs. membership degree graph and simultaneously weights for each attribute is also computed which is plotted between the weight vs. attributes graph. Weighted average vs. attribute graph for workforce challenges in **fig. 6.3**.

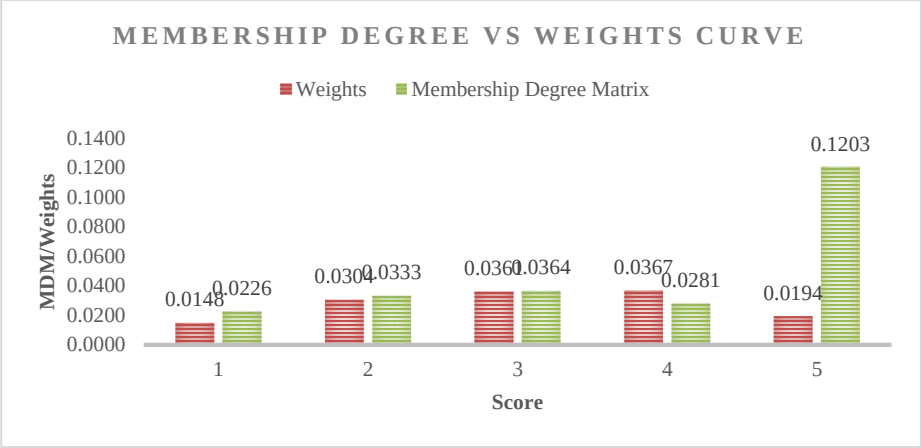

FIGURE 6.3: MEMBERSHIP DEGREE VS. WEIGHT CURVE FOR WORKFORCE CHALLENGES IN BANKING BUSINESS

A workforce challenge index computed using decision parameter computation was agreed upon from several scenarios considering membership degree versus attributes curves and formulation of Risk Index (WCI) was given as per Equation 5.6.

$$WCI = \frac{1*A_{12} + 2*A_{23} + 3*A_{34} + 4*A_{45}}{A_T} \qquad \textbf{(5.6)}$$

Where the area under the curve between the attributes i and j is named $\mathbf{A_{ij}}$ with: **i=1, 2, 3, 4** and **j = 2, 3, 4, 5.** the total area under the curve is $\mathbf{A_T}$. (Table 6.2 shows A_{12}, A_{23}, A_{34}, A_{45} & A_T Value)

6.3 Classification of bank-specific challenge Index

Once the overall bank WCI has been calculated, further risk zone needs to be decided under which our Indian banks are falling. In order to estimate the risk zones all selected ten banks WCI has been calculated (10 banks selected and discussed in methodology section with individual bank respondents). All selected 10 banks WCI has been portrayed in table 6.3 and same has been plotted in figure 6.4. After plotting these challenges the various risk classes were obtained.

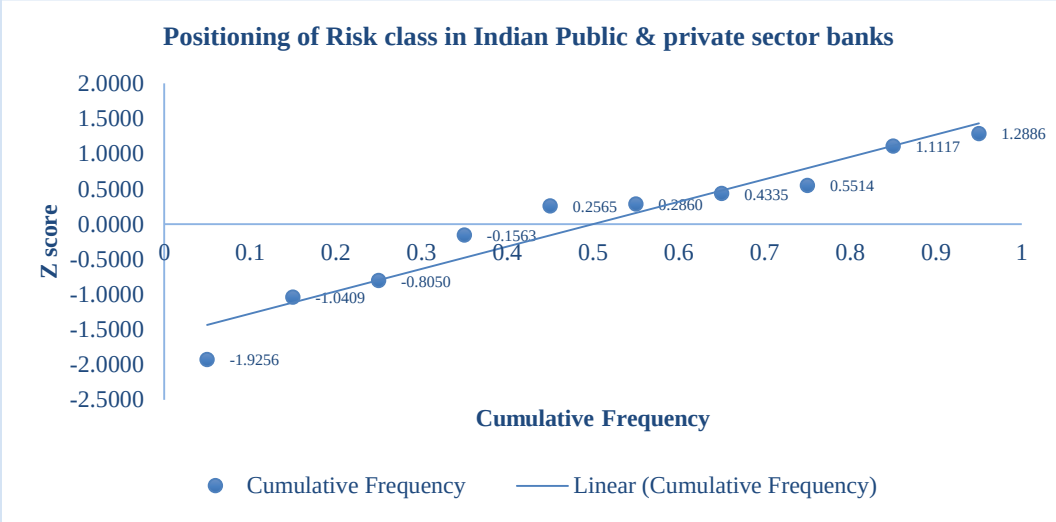

FIGURE 6.4: BANKS POSITIONING IN CHALLENGE ZONES

Workforce challenge Index (WCI) values for ten different banks from the public and the private area has been analyzed in Table 6.3.

CLASS 1: Extreme challenge; it is highly unmanageable challenge class; having WCI value above 2.3 to 3.0.

CLASS 2: High Challenge; the challenge is very high, and it can be transferred using some policy implications, having WCI value between 2.15 and 2.30.

CLASS 3: Natural, average banks are having an Average challenge with the possibility of managing probability and severity of challenge factors having WCI value between 2.13 and 2.15.

CLASS 4: Mainly moderate challenge, projects, having WCI value between 2.10 and 2.13.

CLASS 5: nominal low side, the low challenge with almost no impact having WCI values between 2.0-2.10.

Bank name	WCI Index	K Value	Cumulative Frequency	Z score	Challenge Class

Axis Bank	2.159	1	0.95	1.2886	High
SBI	2.153	2	0.85	1.1117	High
PNB	2.134	3	0.75	0.5514	Natural Average
Canara Bank	2.13	4	0.65	0.4335	Natural Average
Yes Bank	2.125	5	0.55	0.2860	Moderate
Kotak Mahindra	2.124	6	0.45	0.2565	Moderate
Central Bank	2.11	7	0.35	-0.1563	Moderate
HDFC Bank	2.088	8	0.25	-0.8050	Low
Bank of Baroda	2.08	9	0.15	-1.0409	Low
ICICI Bank	2.05	10	0.05	-1.9256	Low

TABLE 6.3: WORKFORCE CHALLENGE INDEX AND CHALLENGE CATEGORY BASED ON ASSESSMENT

A workforce challenge Index computation was agreed upon from several scenarios considering membership degree versus attributes curves and formulation of Index (WCI) and was given as (Ergin et al., 2003) The higher the WCI value – the Higher the workforce is at risk class. The current study WCI value come out as 2.114 which as per risk zone category falls under natural average risk class.

6.4 Employee opinion to validate results- data interpretation

The Attribute values ranging from 1 to 5 signify the rating value of the challenge assessment. As visually seen in weighted averages vs. attributes histograms, high weighted average on attributes (e.g., Attributes 4) reflects a high challenge (high rating) value. Conversely, a high weighted average value on attributes (e.g., Attributes 1 or 2) reflects a profound challenge (low rating) value. In Figure 6.3 Weighted Averages Histogram for banking workforce challenge parameters, it gets the highest value for attribute four, and the graph of membership degrees is high at attribute five. Interpretations of these graphs may be based on the skew of the curve where a curve skew to RHS reflects high challenge value, and conversely, a curve skew to LHS reflects a low challenge value. Here in figure 6.4 for the curve is very much skewed to the right-hand side, so it is tending to the high challenge. After seeing the Challenge index value for the banking sector has come out as 2.1145 which shows that banking workforce is under natural avergae challenge zone based on the scale defined in the previous section.

The study has segregated the challenges of public and private sector banks, and the challenge index estimation is shown between annexure III to VII. The study reveals between public and private sector banks by and large the index value falls under natural average and moderate challenging zone with WCI value around 2.13 and 2.10 for public and private sector banks. While doing a micro-management for both public and private sector banks, the most influencing factors are also

common except public sector banks are more affected through Employees adaptability to change whereas private sector banks are facing mostly challenges regarding skill deficiencies. During one to one interaction with bank officials, they mentioned that in public sector banks this phenomenon is prominent since the job security make people reluctant to learn and go for advances in banking business which in a nutshell have a long-term impact on banking business.

Closely monitoring the banks mentioned in table 6.4, it reveals that two banks, i.e., Axis Bank and State bank of India workforce are facing a highly challenging situation. The attrition rate in Axis bank is a significant challenge. Also in parallel, technology-based training is not provided on time which leads to create an inferiority complex among employees and either they migrate to other business or either they further go for higher education to suffice in the environment and upgrade their skills.

State bank of India employees mentioned that schemes like voluntary retirement are a solution which is adopted by various employees who served the bank for more than twenty-five years. It is proactive move to address job redundancy in the technology-enabled banking environment.

The survey shows ICICI, HDFC, and Bank of Baroda have created an employee friendly environment. The training exposure provided by these banks to their employee score high as compared to other banks. The employees opined that technology-enabled training makes them ready to face technology change in the banking industry.

6.5 Validation of fuzzy logic analysis

The influence of fuzzy grading matrix on the result is below 5%, and it has a little impact on the calculation challenge index value. However, the input matrix and weights of the parameters have a considerable influence on the calculation of WCI value. The sensitivity analysis has been done considering different scenarios as follows i) changing response scale of the questionnaire from 5 to 4; ii) changing method for fuzzy logic calculation from triangular to trapezoid; as shown in table 5.12. In each scenario, the challenge index value changes from the original value within the range of 10% to 15%. However, the challenge range remains the same; study signifies the result on significance scale of 5%.

Stage/operational	**Challenge**	**Response Scale**			
Method		**1 to 5**	**Challenge Type**	**1 to 4**	**Challenge Type**
Centroid	Challenge Probability	2.15	Moderate	2.05	Moderate

	Challenge Severity	2.14	Moderate	2.14	Moderate
	Pro*Severity	2.13	High	2.11	Moderate
Trapezoid	Challenge Probability	2.08	Moderate	2	Moderate
	Challenge Severity	2.35	High	2.149	High
	Pro*Severity	2.21	High	2.078	Moderate

TABLE 6.4: SCENARIOS OF CHALLENGE WITH CHANGING FUZZY THEORY & RESPONSE SCALE

6.6 Out of box test

The results of fuzzy logic have been validated using out of box test, where the test validates the model. The fitness of the model is tested by drawing random samples from the total 635 responses. Four subsets are formed with a sample size of 150, 300, 450 and 635 respectively. Workforce challenge index is calculated for every set of random samples, and the results are shown in Table 6.5.

Banks	Respondents	Challenge Index	Variation from base	Challenge Type
	150	2.14	4.50%	**High**
	300	2.15	3.25%	**High**
	450	2.10	6.48%	**Moderate**
	635	2.15	Base	**Moderate**

TABLE 6.5: OUT OF BOX TEST ON THE BANK WORKFORCE CHALLENGING RESPONSE

The interpretation of table 6.5 shows where via using out of box analysis, the different respondents randomly were considered for index calculation. The outcome with 150, 300, 450 and 635 respondents have shown challenge index value varies within 7 percent of significant scale. The challenge remains under a high zone. As a result, the result holds accurate with a deviation of 7 to 8% from the standard base.

The above mentioned way was used to assess the workforce challenge index for Indian banks and so as their respective challenge classes, where these banks are falling. It is evident that few banks are at higher risk whereas few banks are relatively lower risk. Reasons for deviations are also not same in public and private sector banks, and also why reasons are varying will be discussed in next chapter in detail.

6.7 Chapter Summary

Workforce challenges associated with Indian banking business are identified and quantified. The quantification is done by calculating the workforce challenge index using a fuzzy logic approach. The index is further segregated into public and private sector banks. These challenge's serve as a checklist that covers all possible challenges associated with the workforce of the banking business. Policy makers, human resource manager or decision-makers may be able to understand the challenges and take corrective action plans. The workforce challenge index can be used as early indicators of banking problems or potential difficulties. Moreover, despite following the same regulations under banks regulated by RBI why the workforce challenge index are varying? The answer to this tranquil situation has been tried to answer in the next chapter where mitigation measures are suggested.

CHAPTER 7

MITIGATION MODEL FOR WORKFORCE CHALLENGES

The banking industry is one of the largest recruiters where human resource management plays a significant role in the banking business. Several studies have examined the relationship between the importance of HRD and its effect on the organizational performance. According to the (Asian Development Bank, 1999), India needs to accelerate structural reforms directed towards its financial and capital markets, concentrate on infrastructure and public finance consolidation and strengthening support for human resource development to ensure sustainability of reform process in the banking sector that have impacted the sector extensively (Reddy, 2005).

There is a need to focus on developing human resources to cope with the rapidly changing scenario. In transforming Indian banking into a vibrant system, initiatives would not work unless quality human resources are available (Jalan 2001, 2002). The success of an organization depends on how efficiently it manages its human resources and adapts to change, matches with the global standards and continual up-gradation in the organization (Gupta, 2003). Banks require human resources that are flexible and adaptable to the changing technological environment. Quality of human resource should commensurate with the ability of banks to deliver value to customers. Banks should emphasize the need to streamline human resource development strategies with business strategy (Kamesam, 2004). It is the impact of change, technology and challenges of enhancing the quality of existing workforce and explaining the importance of changing HRM in the Indian banks, which is set to face more challenges (Nair, 2006).

Dynamism in Indian banking can be attributed to the challenges like the upward direction of interest rates, demanding customers, financial inclusion, technological advancements, competition for human talent and efficient-utilization of a bank's resources (Financial Express, 2010). Other challenges before Indian banking sector, according to (Kamath et al., 2003) are changing needs of customers, coping with regulatory reforms, thinning spread, maintaining high-quality assets, management of impaired assets, keeping pace with technology up gradation, healthy bottom lines

and increasing shareholder value. The drivers of dynamic changes create challenges, which need to be addressed to unleash the composite advantage provided by the Indian banking sector.

7.1 Mitigation Model

Banks are increasingly looking for new avenues of growth by adopting new technologies. Any failure to adopt new technology may place the bank at a competitive disadvantage. At the same time, disruptive technologies may pose new challenges to the banks. Banks should be proactive in adopting new technologies. Any technology adoption should be looked at in the context of business needs and its effect on the workforce challenges. Investing in new technology will undoubtedly enhance customer value, but also cause an adverse impact on the workforce. Banks need to align the technology strategies with workforce challenges. According to the McKinsey Report on the future of bank risk management, by 2025 risk functions in banks will likely to be fundamentally different than they are today. The nature of chance in the banking industry is going to be more robust as compared to the past. The significant challenges of banks due to disruptive technologies are classified into two broad categories. One is the business-related challenges, and the other is related to the workforce. Banks need to have a framework to anticipate the workforce challenges and take corrective measures. The proposed model for risk identification, measurement and mitigation are shown in Figure 7.1.

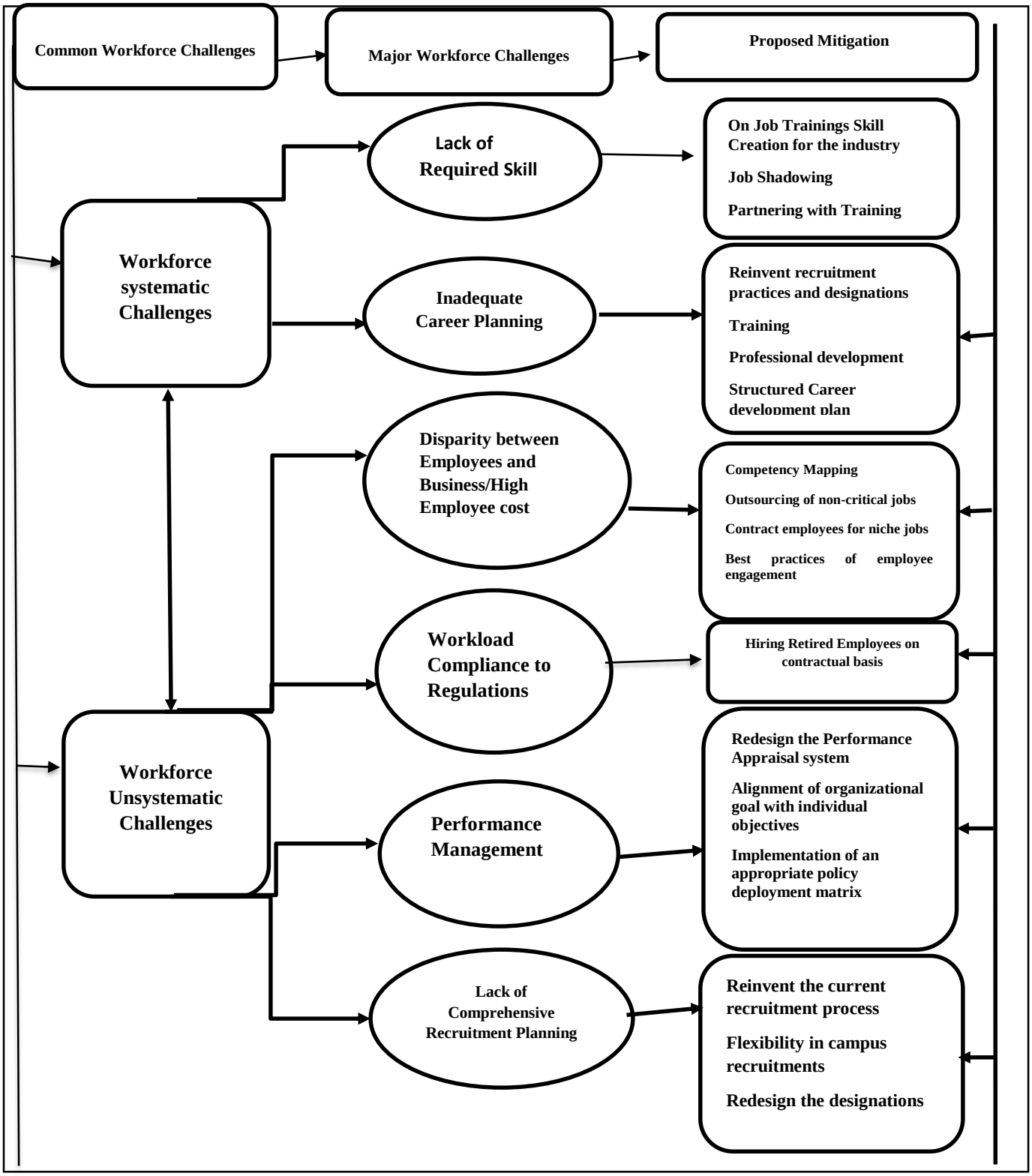

FIGURE 7.1: WORKFORCE CHALLENGES MITIGATION MODEL

The digital revolution has led to the creation of new industry comprising technology, financial services, and e-commerce. The mushrooming of Fintech firms has given a boost to job creation in the field of Information technology, mobile app development, data analytics, Machine learning and Artificial Intelligence, which has created a new demand for technology-oriented skills. The opportunities created by new generation tech firms uniquely suit the millennials. As a result, banks face the risk of losing talents to the new generation financial start-up firms.

Brain drain is quite common to all sectors but very critical to banks. Banks also face the risk of an aging workforce. There are cases where the top level executives have taken voluntary retirement for a lucrative career in fintech firm, which creates a challenge for banks to fill the gap. Banks can come out with strategies to migrate the customers from using traditional delivery systems to digital platforms. It will help to reduce the cost of service and increase the employee productivity, with the increasing demand for digital transactions and higher penetration of smartphones, banks need to optimize their branch expansion.

Banks can leverage their investment in technology by treating customer channel migration as a priority. Numerous methods (i.e., loyalty program incentives, higher interest rates.) can be used to drive the migration of customers to low-cost channels. Few mitigation measures are suggested in this chapter to address the workforce challenges. The mitigation measures are based on extensive literature review, expert opinion, and discussion with key officials in various banks.

1.0 Competency mapping and Professional Development

Through assessment authors realised that competency mapping is one of the sensitive challenge in public sector banks. The same is evidenced via use of technology in banking business reduces the human interventions and thus makes few job profiles redundant. Most of the jobs performed by human will be replaced by automation, Internet of Things and Robotics technology. The need for a customer to visit a bank branch in person to perform transaction will gradually disappear. The future of banking is moving towards virtual banking. Therefore banks need to identify the critical competencies[20] required for the future. The required competencies can be classified into technical and non-technical skills. The average shelf-life of new technology is much shorter. As a result, the

[2020] competency is that it is something you need to be able to do well in a specific job role

delivery channels and processes undergo frequent changes. So the workforce needs to be highly flexible in adapting to the changing technological environment.

In the transition from traditional to digital banking, the capability of banks does not depend only on the total of the workforce. It depends on how adequately the bank is equipped to use its talents through identifying competencies, placing the right person for the right job, developing competencies and adequately addressing the competency gaps. Banks need to brainstorm and identify the competencies required for the present and future business needs. A well-structured competency mapping exercise should be done across all levels. Training programs can be designed to impart contemporary development in technology and technical skills.

2.0 Outsourcing Non-Critical Jobs

Technology has become the backbone of banks in the modern era of digital transformation. There is tremendous potential for banks to outsource specific specialized tasks and processes. The overall banking functions can be classified into the core and non-core activities. Most of the non-core activities like data handling, documentation, the document storing and processing are outsourced. Focusing on core competencies would enhance the productivity levels of employees and helps the bank to optimize employee cost. Outsourcing noncritical jobs would reduce the workload of existing employees and enhance employee productivity.

3.0 Enhancement of Training Exposure

Banks across India are going through a rampant digital transformation and infusion of new technologies. The oldest public and private sector banks are reinventing their business model to keep pace with the technology disruption. The change is possible only when the banks redesign the nature of training given to the bank employees. The rate of change in technology is much faster than ever before. Therefore banks need to have a robust and flexible training program that focuses on technology as an essential element.

Digital revolution has transformed banks into technology companies with a banking license. The cycle of transformation is getting compressed due to changing customer experience. Bank's business processes, delivery models and IT are closely intertwined. So banks are bound to create

a digitally empowered workforce. Banks can tie up with institutes to provide technology-focused training programs.

An employee at the front lines needs to be vested with the knowledge and awareness of the digital strategies of the bank. The future of banking will be branchless banking where all transactions will be operated with the help of apps, internet, and mobile banking. The scalability of networking technology would enhance the potential of banks to process 20,000 transactions per second. For instance, the blockchain technology will integrate the banks, lenders and technology companies. Artificial intelligence will bring more atomization in processes. These initiatives call for reform in the training exposure to the bank employees. Banks have to identify the specific training needs which can be integrated with the performance appraisal. An organization-wide knowledge management system can be created to reskill and upskill the workforce. Sources of RBI suggested that banking operational loss due to human errors is 7%. Therefore employees should be well trained with the latest technologies and make them understand the effect of human errors on profitability. Banks may address these issues through a well-structured training need analysis and on the job training.

Banks can leverage new technology under two perspectives. Use of technology in process and service delivery models as drivers of value. At the same time, customers should be equipped to use the new technology. Banks need to create a platform to make the customers aware of the technology-enabled services and means to educate the customers with new technology.

Extensive use of technology in complaint handling process may reduce the cost of handling complaints. Of the total complaints received by OBO, 44% are received through email, 17 % online and post/fax and courier accounts for 39 %. It can be seen that complainants prefer electronic mode (Email/Online) for lodging complaints. The complaints lodged through Email and the online CTS increased from 49% in 2015-16 to 61% in 2016-17. During the last three years, the proportion of complaints lodged through real mode has declined from 63% in 2014-15 to 51% in 2015-16 and further to 39% 2016-17. Year-on-year basis, the proportion of complaints lodged through Email has increased substantially by 63% followed by online 45%. Banks can use chatbots to bring more customer orientation.

4.0 Reinvent the Current Recruitment Process

Skill deficiency is a big challenge for Indian banks irrespective of public or private sector banks, to address this issue the bank recruitment process was analysed by authors. Earlier banks recruit probationary officers who start their career in junior management level and then elevated to higher levels. They become generalists who would acquire experience along the way and apply the basic principles to handle various departments. There are fewer roles where banks hire specialists. These roles include marketing, legal, risk management, 'learning,' investments, economic research. The changing industry dynamism in banking has created the demand for new specializations and jobs on demand. New roles such as system analysts, digital analysts, and Chief technology officer, are to be created to meet the demand for technical skills. The traditional recruitment process through banking exam cannot meet the banks need for specialized skills. The banking recruitment policy needs a complete overhaul of the current business scenarios.

5.0 Flexibility in Campus Recruitment

There is a vast difference in recruitment policies of public and private sector banks. Public sector banks need to adhere to the recruitment policy of Government. The recruitment policies are static with limited scope for flexibility. Banks cannot afford to have static policies when the business model is more dynamic. There is a need to have a diversified set of skills covering all spectrums of competencies. Apart from handling operations, banks need to compete in the market. Customer attraction, retention and relationship management requires candidates specialized in marketing. Similarly, the increasing compliance has created demand for legal experts. Consolidation, mergers, and acquisitions require specialists in the field. The diverse nature of talents can be hired from various campuses if banks follow a flexible recruitment policy.

6.0 Structured Career Development Plan

A career in banking is one of the most lucrative opportunities sought by many aspirants. Banks provide a bright career progression. Performance and potential are the essential elements that determine the career progression. Most of the senior official in the public sector banks joined as Scale I officer and then gradually elevated to higher levels. It takes an average of 14 years for a person who joined as an officer to become a General Manager. Many banks have Foreign branches which provide overseas opportunities to its employees. The traditional institutional structure and

human resource policies need a major review due to the changing economic, business and technological environment. Capacity building, managing change, skill development, and career planning are the key priorities of banks. The job roles and functions are undergoing a drastic change due to technology disruption. Banks need to recruit specific skills from the open market and redeployment of existing staff in new roles. The significant challenges for the banks are in developing specific essential competencies, skills and carving a career path to the workforce.

The banking industry is one of the largest recruiters for many years. Indian banks employed nearly 13 lakh people at the end of March 2015, out of which state-run banks alone employ nearly 8.6 lakh people, while private sector banks employed 3.2 lakh people. The industry has been witnessing the transition from people driven to technology-oriented delivery models. It has the power not only to transform but also make some of the jobs redundant. Banks need to adopt a proactive approach in anticipating the future of banking, nature of job profile and draft a career development plan.

7.0 Professional development

The banking industry, which is among the significant job creators is at an inflection point where technology is enhancing efficiency by doing more and at a faster pace than what humans could do. The business processes and services are digitalized to provide value-added services. Technology has become the forefront of every decision making in banks. In this scenario, the employees of banks need to keep with the change and update their technical skills. Banks need to tie up with training or educational Institutes to bring professional orientation to their employees. Continuing professional development should be integrated with the career development. Performance management and skill deficiency challenge is directly addressed by authors using professional development.

8.0 Customized Training program

Bank employees are expected to move between roles throughout their career. They need to update their skills for every job role continually. Over the years, banks have expanded their business both geographically and functionally. Specific roles at the front and back end services need specific

technical skills, for example, training related to artificial intelligence based on job roles as system administrators and implementers are different. Similarly, SAP training for front office and back-end office is varied which needs to be addressed based on job roles.

9.0 Post-Employment Studies

The bank employees in the clerical grade join with undergraduate qualification. As they move forward in their career, there is a need to acquire professional knowledge and higher qualification. Banks should provide opportunities for employees to enroll for the postgraduate course. Some private sector banks have a tie-up with educational institutes to offer customized MBA program. Thus banks can make its workforce competent, flexible, knowledgeable and productive.

10.0 On the Job training

India can become the world's youngest country by 2020 with an average age of 29[21]. Sixty-four percent of India's population will be in the working age group by 2020. The demographic dividend offers India a modern competitive edge. While it is a significant advantage, the country faces a problem of generating employment and employability.

Banks need to continuously enhance the skill levels of its employees to remain sustainable, competitive and to take advantage of new opportunities. The banking personnel, across the cadres, need to be suitably trained to acquire the necessary skill sets to perform their jobs more efficiently. The biggest challenge is to replace the loss of existing talent and skills to retirement, poaching, and resignations and reskill the existing workforce. The training initiatives should focus on continuous upgradation of skills that keep pace with the changing business environment. Of course, in these challenges also lie an inherent opportunity for banks to redraw their organizational profile and to create HR systems and processes best suited to the needs of the future. Banks can institute a standardized process to provide on the job training with appropriate indicators to measure the training effectiveness.

[21] High Commissioner of India to Sri Lanka Taranjith Singh Sandhu said while delivering a foreign policy lecture here.

11.0 Induction Training Program

Banks have been one of the largest providers of employment for many decades. Despite the supply of workforce in the job market, banks face the problems of skill deficiency with recruits. The knowledge and skills imparted by the academia do not fulfill the requirements of banks. As a result, banks need to either set up or collaborate with training institutes to provide an induction program. The content of the training program should meet the demands of changing business environment.

Most of the banks have tied up with Educational Institutes for induction training program, or banks can open their training institute to train employees. The training module covers the fundamentals of banking, finance, and economics. The training module needs to be redesigned to bring more orientation towards digital technologies. Banks may come out with an in-house magazine to share the best practices, articles on new technology and technology-enabled processes and services.

12.0 Creating skills for the Industry

The pace of the workplace in banks is changing rapidly with the implementation of new technologies. Entry-level hiring accounts for a significant portion of bank recruitment. Though innumerous aspirants are looking for banks jobs, the industry has been facing the problem of skill deficiency. There is a widespread skill gap between the knowledge and skill imparted by the academia and the skills expected by the banks. Most of the banks spend a significant amount on induction training program. While banks compete in the market, the current scenario compels the industry to collaborate in creating skills for the industry. Creating mass skill sets for the industry can be achieved only through academia and industry collaboration. Though some of the private sector banks have taken the initiative to collaborate with educational institutes, public sector banks are yet to come forward. Collaboration between industry and academia is critical for generating skills for the industry.

13.0 Mentoring by Retired officials

Mentoring plays a crucial role in building a relationship and creating a culture of bonding. Public sector banks are expected to face the problem of enormous retirement wherein 4, 00,000 officer-

level retirements are expected during 2017-18[22]. The excessive retirements would create a vacuum at the Senior management level. According to financial express, if the banks depend on PO level recruitment, there will be a vacuum for 20 years as there has been no recruitment since the 1980s and there won't be enough talent available, as it takes around 20 years to bring up people up to that level.[23] Public sector banks do not have a system of sourcing from outside for lateral entry. The officers at the lower level are promoted to fill up the vacancies. The Subordinates need to take charge immediately after the retirement of his/her senior. This system has been practiced as a routine transaction rather than a pre-planned system of grooming the subordinate by the superior before his retirement. The retired official may be employed as mentors for critical positions in banks.

The mitigation framework is an aggregate of measures mentioned above which is either applicable at the bank or branch level. On this backdrop, the mitigation measures linked to policy recommendation has been summarised in table 7.1. Whereas table 7.2 and 7.3 highlights the existing best practices followed by public and private sector banks respectively to address the role of information technology in the business process and HR related issues.

TABLE 7.1: EXISTING HUMAN RESOURCE PRACTICES OF COMMERCIAL BANKS

Mitigation measure	Existing policies/practice	Policy modification recommendation
Competency Mapping	The current system of competency mapping is adequate for traditional job profiles. Banks need to do competency mapping for the new job profiles that are more technical.	Segregation of competencies in to technical and non-technical domains; Undertake an organization-wide competency mapping with a focus on knowledge, skills (Technical and non-technical) and attitude for various job profile; Bridge the competency gap through the appropriate training program.
Outsourcing Non-Critical Jobs	Outsourcing is done in areas such as ATM maintenance, cash handling. Current practices for outsourcing can be expanded to other non-value adding jobs.	non-core activities like data handling, processing and documentation can be outsourced

[22] Financial times, April 2015
[23] Achintan Bhattacharya, director, National Institute of Bank Management (NIBM).

Enhancement of training exposure	Banks provide structured induction training through professional training institutes.	Tie up with Institutes of excellence to provide technology-focused training programs, training needs to be integrated with the performance appraisal, well-structured training need analysis and on the job training; create a platform for exposure to emerging technologies.
Reinvent the current Recruitment Process	Public sector banks follow a uniform recruitment system. Aptitude test and personal interviews are mainly used for selection; Reference checks are done, Marketing and recovery officers are recruited on contractual basis (SBI and PNB follow partially). Employees are promoted internally to lateral levels.	Lateral entry suggested for hiring specific job roles like marketing, legal, risk management, 'learning,' investments, economic research.
Flexibility in Campus Recruitment	Currently banks recruitment mainly through IBPS exam where Aptitude test and personal interviews are mainly used for selection. The existing system of hiring through common bank exam facilitate banks to hire a human resource for generic skills.	Campus hiring program for niche technology specific jobs that cannot be met with the current recruitment system.
Structured Career Development	The career development policies of PSU banks were designed in the past when there were less on no digitization. It needs an overhaul to changing business environment.	Enhancing and making flexible career development policy linked to the tenure of promotion and appraisal of employees.
Professional Development	Professional development training is at its primitive stage, which sometimes has been followed by in-house training institutes.No structured professional development program	Banks need to tie up with training or educational Institutes to bring professional orientation to their employees; Continuing professional development should be integrated with the career development.

Customized training programmes	Training is mostly confined to induction.	Training related to specific job roles that require a high level of technical knowledge. For example use of Blockchain in banking, Artificial Intelligence, Big Data analytics. Plan an organization-wide training program customized to suit the emerging needs of banks.
Post-employment studies	Some bank has constituted "advisory council" comprising management experts, academicians, and the Bank's senior executives. The advisory council decides on employee's further studies which are very limited due to excess work. Employees pursue higher studies out of their interest.	Employees may be encouraged to pursue higher studies through enrolment of degree/diploma program that is linked to career development.
On the job training	Though on the Job training programmes are in place, employees could not get a chance to attend the training. The effectiveness of such training is not measured.	On the job training may be provided during the implementation of new technology.
Induction training programmes	Most of the public/private sector banks usually keep induction training, and most of the banks have come up with their training institutes but due to the short span of time induction training are limited to few job profiles as probationary officers, whereas most of the profiles are not get getting any induction training	Tied up with Educational Institutes for induction training program or banks can open their training institute, redesigning of training modules. Coming out with the in-house magazine to share the best practices, articles on new technology and technology enables processes and services
Creating skill for industry	There are only a few instances of banks collaborating with academia to create skills for the industry.	Collaboration between industry and academia is necessary for generating skills for the industry. Banks can collaborate with academia to offer

		courses that meet the skills needed in the banking industry.
Mentoring with retired officials	Currently mentoring with retired employees or senior officials are not followed on a regular basis though sometimes there are senior bank employees are arranging guest lectures.	Grooming the Subordinate by the Superior before his/her retirement; retired official may be employed as mentors or advisor for critical positions in banks

TABLE 7.2: ROLE OF IT IN AUTOMATION OF BUSINESS PROCESS AND HRS (PUBLIC SECTOR BANKS)

Role of IT in automation of business process and Human resource systems(Public Sector banks)		
Name of bank	**Existing Best Practice/ Policy**	**Mitigation to workforce challenge**
Bank of Baroda	To improve the interaction with customers at onsite or foreign locations, SBI is conducting grooming and etiquette sessions so that business with HNI or foreign customers should enhance. This training is at regular intervals and mostly provided to front-end interface employees of bank. The program is well known as SEED (Self-efficiency and effectiveness development) programme.	**Training**
SBI & Union bank	Almost all the public sector banks have established their Staff Training Colleges where training for different cadres of employees are organized on a regular basis to update their skills and knowledge. In some cases, employees are sent to premier Institutes like IIMs NIBM. For training.	**Training**
SBI	The compensation is one of the essential components for employees to make them stable for work profile simultaneously arose interest also to be stick with the job. Align to this in Indian banks mostly the compensation is decided based on Bipartite Settlements. The revision of pay scale happens every fur year. The United Forum of Bank Unions (UFBU) which comprises representatives from various unions of Workmen staff and Officers and IBA (Indian Banks Association) jointly provides a suggestion in bipartite settlement and accordingly pay revisions are implemented.	**Compensation**

All public sector banks	For a selection of bank employees, IBPS exam holds applicable for all nationalized Indian banks. The frequency of IBPS exam is once every year for the recruitment of Officers. Another test is conducted specially for clerical cadres, the validity of the result is for one year. Whenever banks require staff, they place their indents on Indian Banking Personnel Selection (IBPS) further which IBPS conducts interviews of the passed candidates.	**Selection**
Canara bank	Canara bank emphasizes on preliminary level Interview which does the stress testing of the employee to check whether the candidate is the right fit to be part of the system. During Induction training candidate get exposed to various norms and system of banks.	**Induction**
Canara bank	Since Canara bank recognize the healthy development of employee is essential so as a result, 'Bangalore School of Training,' the in-house training center of the Bank, caters the need of employees based on upcoming trends and current requirement of the banking business.	**Training**
Canara bank	Knowledge up gradation is an essential element for any business organization which helps to suffice with upcoming challenges of competition. This area needs continuous updating Canara banks to promote this kind of system and offer specific incentive schemes as HR initiatives for self-development of employees.	**Self-development incentives**
Canara bank	The concept of Study Circle directly hits self-development of employees by instilling a desire to acquire/update knowledge, information, and experience. It also triggers the thought process and facilitates personality development. The human resource practice provides a platform to employees to showcase their talent and rewarded if the talent is handy for banking tangible or intangible growth.	**Study circle**
Bank of Baroda	In BOB a Performance Management system has been formulated and implemented for all officers w.e.f. 2009-10 onwards. The new system characterizes the approach as per which management of issues and employee performance should be targeted. This system has various phases as performance planning and goal-setting which takes it further to performance review discussions, feedback, and development.	**Employee performance management system**
Bank of Baroda	The decision makers of banking business for them executive development programmes are being conducted on regular intervals for newly promoted senior and top management people in conjunction with leading Business schools like ISB, Hyderabad, MDI, Gurgaon, National Institute of Bank Management, Pune.	**Leadership development**
Bank of Baroda	To avoid banks frauds and also to provide a platform to employees to perform in other domains also with specific skills, role change programmes are being conducted for newly promoted employees at the bank's training establishments. The programmes mostly provide inputs on behavioral issues, soft skills, teamwork, and leadership.	**Role-change programmes and executive development programmes**

Punjab National bank	To strengthen Industrial relations which gives support to banking business cordial relation needs to be maintained between banks and industry officials. The same has been ensured via meetings between the bank management and the representatives of the majority Officers" Association and Workmen Union over the past many years.	**Industrial relations**
Punjab National bank	PNB Parivaar provides a People Soft Package containing an exhaustive database of all the employees, which helps to effectively utilize technology for implementing all employee-related tasks such as compensation, staff welfare benefits, many reimbursements, transfers and postings, terminal benefits, leave rules.	**Technology-Based HRMS**
Central bank	Central Bank has taken the initiative to tie up with university graduates who would be the potential employees. For many years, Bank seeks university as a potential customer base due to numerous accounts associated with university system also it provides internship or training opportunities at regular interval to train employees. These programmes mostly run as a summer programme where potential employees can work in the bank between semesters. These initiatives provide an opportunity for interested graduates (mainly in the economics and finance areas) to consider a career in the bank.	**Recruitment & selection**
Central bank	Job evaluation is the process which determines the relevant criteria that the bank wishes to use to assess positions to assist management decision-making and planning. Bank has devoted considerable resources, whereas a part of the move the bank has made from a formerly rigid remuneration and job evaluation structure, where the staff was allocated into one of a large number of graded positions and where remuneration is paid according to the job grade.	**Job Evaluation**
Central bank	The bank has made an explicit commitment to provide training for its employees. The central bank aims to provide an average of 20 hours of training and development per employee per annum. Training and development take many forms, depending on technical skills are provided to personal staff where this is considered beneficial to their career path in the bank, the needs of the job at hand and the Bank's priorities.	**Training & Development**
Central bank	Central bank promotes Career values survey which helps to identify the career drivers at the moment of survey for bank staff and their importance. The survey boosts the awareness of bank officials to work in a specific area which is reducing the motivation of bank employees. The accurate survey helps to recognize the driving boosters to generate among bank employees.	**Motivating and rewarding staff**
Central bank	Succession planning has been developed by banks as part of some strategies to assist in the retention and recruitment of employees. It works as an alumni network where if require banks can approach experienced and competent employees to bridge the gap of any deficiency if happens in the system. The bank approaches these people via email and keeps them informed of vacancies in the Bank.	**Succession planning**

TABLE 7.3: ROLE OF IT IN AUTOMATION OF BUSINESS PROCESS AND HRS (PRIVATE SECTOR BANKS)

Role of IT in automation of business process and Human resource systems (Private Sector Banks)		
Name of the bank	**Existing Best Practice/ Policy**	**Mitigation to workforce challenge**
ICICI bank	ICICI has initiated human resource automation process in 2000. Since then the bank has been progressive in using digital technologies for customers and employee's engagement. For example, the bank uses algorithms to decide employee transfer. The reasons for transfer such as post-marriage relocation, health reasons, and transfer to hometown are coded using an algorithm. Based on the weight, the algorithm identifies the vacancies and prioritizes the transfer requests. The algorithm allows the bank to handle employee transfers effectively by removing personal discretion and bias. Most of the HR processes are atomized using the latest technologies. Digitization is used to a large extent with an objective of bringing more mobility, connectivity and straight through a procession of all transactions.	Atomization of the human resource process
ICICI bank	The banks conduct an app based performance appraisal. The appraiser is expected to provide an app based instant feedback to his/her subordinates. Senior manager appraisals are done by consolidating app-based instant feedback.	Performance Appraisal
ICICI bank	ICICI has developed a virtual Amphitheatre, an app based application that could connect 80,000 people during the same time. It provides 2-way communication, where the Leader can address all employees at the same time. The viewer can switch to video conference mode and can interact with the leader during the webcast. The app also facilitates the leaders to make e-visit of every branch. Data from the canteen is generated to monitor employee health.	Employee engagement
ICICI bank	The bank leverages technology in the recruitment process. It has created a platform for the candidates to attend an interview by being at home through I-Studio a video-based platform developed internally by ICICI Bank.	Recruitment process
ICICI bank	The bank has launched a business leadership program in a tie-up with National Institute of Securities Market. Employees can register for a postgraduate certificate in the securities market.	Skill development
ICICI bank	A successful career plan requires individual knowledge, skill set, qualification, interest, and aspiration to correspond with each other. The career counseling program of ICICI banks facilitates the job aspirants to understand various career opportunities.	Career counseling
Axis bank	Axis bank had made considerable investments to create a data repository and analytics workbench. It has implemented open stack technologies that support private and public cloud deployments. It facilitates the bank to increase scalability and massive storage capacity. The bank is also experimenting with artificial intelligence.	Ease of maintaining documents and enhancing employee productivity

Axis bank	The bank has taken many initiatives to enhance employee experience through personalized human connect and by using technology. Best in technology is employed by the banks to automate HR processes and the internal employee portal. "My connect" an internal portal provide employees with a seamless and digitally enhanced HR experience.	Employee engagement
Axis bank	Axis bank provides various learning platforms such as classroom programs, external training programs, certification programs, and e-learning modules. It also had a tie-up with reputed institutes to offer Leadership development program, Executive development, and middle management training program. It also has tied with MOOCS provider course – the world's largest education company. Through this tie up the bank offers customized courses from leading global universities at an affordable cost. The primary objective is to develop skills based on leadership, big data, analytics, and customer service.	Learning and development
Axis bank	Axis bank engages with universities and institutions to ensure an adequate supply of skilled workforce with day-zero productivity. Management trainee program provides career paths for recruits. Graduate Leadership Program is oriented to attract top talent from the country's best campuses. "We – Lead: Axis bank – ISB women leadership program is to bring diversity in leadership talent pipeline.	Talent acquisition
Axis bank	Axis is one of the earliest users of public cloud services for some of its services. It has its cloud to store customer data and also use cloud service from Amazon and Google. The use of hybrid cloud service helps the bank to save cost.	Data storage and management.
Axis Bank	The bank has a vision of being present where the customer is and on their preferred model of channels. It extensively promotes mobile as one of the primary channels for the transaction. The launch of the mobile app had helped the bank to witness a triple-digit group in some users and volume of transactions on mobile. There has been a massive shift from branch banking to the digital platform where 90 percent of transactions happen on the electronic channel.	Customer engagement
Axis Bank	Axis had launched LIME, an app that targets the youth, which works as an initiative of research undertaken by Axis bank to understand the expectations of youth apart from mobile and social apps. The outcome of the research shows many people were looking for apps that follow their lifestyle rather than a simple banking app. It was India's first mobile app integrating wallet, shopping, payments, and banking. There were more than 5 lakh downloads of the app.	Employee creativity
Axis bank	Internal digitization has improved the turnaround time and enhance customer experience. The bank had gone for seamless integration of various processes and systems inside the bank. Many processes were redesigned making a technology shift to meet the requirement of internal and external customers.	Business process optimization

HDFC bank	HDFC Bank has launched an innovative interview platform that uses analytics, AI, and ML to conduct video-based assessments and enables digital interviewing to screen and select talent. The solution provides a comprehensive tool using multiple aspects of decision-making by analyzing a candidate's resume content as per the hiring manager's requirement. The project has been globally recognized by platforms like the Asian Banker Summit and the Employee Engagement Achievers Awards.	Talent acquisition
HDFC bank	HDFC bank position itself as a premier digital bank. It had launched its advertisement campaign with the tagline 'Har Zaroorat Poori Ho Chutki Mein, Bank Aapki Mutthi Mein.' It has taken various initiatives to bring digitization in service delivery. The bank offers digitally enabled products such as Instant accounts, one-click payments, one-click shopping, 10-second loans, and quick investments.	Brand positioning
HDFC bank	HDFC closely monitors the trends that emerge in the fintech and startup space to adopt the latest technologies in banking services. The continued exposure to digitization has helped HDFC to reduce the branch transactions. The share of internet and mobile banking transactions had increased from 44 % in 2014 to 71 percent in 2016. HDFC has initiated the "Go –digital strategy recently and conducted a Digitial innovation summit in 2018. About 30 start-up firms have been shortlisted from 150 fintech firms. The bank has selected products from 5 fintech companies during the during the digital innovation summit. The companies are from artificial intelligence, marketing, quality assurance and payments using mobile and biometric domain. The bank's artificial intelligence- (AI-) driven chatbot Eva was an outcome of the tie-up. It is also looking at fitness to come out with solutions that will 'hyper personalize' the bank's engagement with customers.	Digital orientation
HDFC	HDFC has a partnership with 50 technology and business schools to get exposure to new fintech ideas. It has tied up with IIT Bombay and IIT Roorkee and Centre for Innovation Incubation and Entrepreneurship (CIIE) at the IIM-Ahmedabad to mentor and hand-hold fintech startups from those institutions. The partnership enables HDFC to work with the Entrepreneurship cell and identify potential fintech ideas at the nascent stage and help them evolve into a customer-ready product. The bank mentors the startup on customer experience, reduce time to market. It also provides its banking platform to the startup for testing their ideas in the real world. The start-ups are provided access to the lender's domains to test new products in the absence of finance laboratory.	Use of technology in service
HDFC	HDFC Bank has tied up with Mahindra and Mahindra to develop passenger vehicles with an integrated, voice-controlled banking app. In future, it is possible for a customer to recharge his smart card while passing the toll by merely giving a voice command "Recharge my card" to the dashboard. The humanoid IRA(Intelligent Robotic Assistant) guide customers at the branch to approach the relevant counter. The chatbot EVA (Electronic Virtual Assistant) answer customer queries using artificial intelligence.	Digital strategy

7.2 Policy Recommendations

Indian public and private sector banks are ready to adopt new technological development and always encourage their workforce to come on pace with advance technology related development. Banks need to emphasize human resource policies that aim to create a favorable environment for the overall growth of employees and thus to allow them to decipher their abilities into character related abilities. All human resource connected involvements are based on the viewpoint of distinct and structural development. In the light of wide gaps, public sector banks are likely to face challenges in the next few years, need long run and practically viable recruitment and selection, rewards or compensation along with promotions and transfer policies.

As far as private banks are concerned, most of the private banks have adopted a human resource policy which is not only robust and flexible but also objects to generate and cultivate a dedicated, inspired and a familiar pool of talent. Rural talents have also been promoted via banks via recruiting contenders from Tier-II business schools as well. Continuous training, the opportunity to work on challenging tasks, and job rotation are part of the bank's talent retention strategy. Training is an area of continuing focus for the bank to ensure that its professional skills are equipped to maintain high standards of customer service and are also aware of the latest developments in their specializations by focusing on upgrading the professional skills of each. The bank has a great- structured performance-linked scheme of variable pay and employee stock options for all the employees across grades and functions. On its performance and employee motivation.

Therefore, the developing technology development and human resource environment stance both openings and intimidations for the public and private sector banks. The primary emphasis should be to assimilate the human resource policies with the skill-specific business strategy, covering the aspects of recruitment, placement, performance management, rewards, and training and development. This work as a radical transformation of the existing human resource management policies and practices in the selected public and private sector commercial banks.

In nutshell, it can be said that HRM policies and practices of all the selected commercial banks in the above background are concentrated on domains such as recruitment, promotion and placement, compensation, training and development, and motivation of employees to work for ensuring that

these policies are suitably designed and implemented, thereby helping the workers to set and achieve individual and organizational goals.

- **Recruitment process**

  Public sector banks recruit employees through a standard written exam. This system has been one of the best of its kind to hire talents. The examination pattern has been meticulously designed to test the analytical skills of candidates. The flip side of this process of candidate recruitment is more laborious and time-consuming. Lakhs of candidates appear for few vacancies. The shortlisted candidates are called for personal interview which is done face to face. This process consumes time and resources and also requires the candidates to travel long distance. There is ample scope for the public sector banks to use technology in recruitment and to simplify the process. Among private sector banks, ICICI and HDFC bank interviews video platform. HDFC Bank has launched an innovative interview platform that uses analytics, Artificial Intelligence and Machine learning to conduct video-based assessments and enables digital interviewing to screen and select talent. The entire process of recruitment from application until recruitment is digitized. The potential employers who happen to be millennials are intertwined with mobile technologies. Use of technology in recruitment would help banks to reduce the cost of hiring and attract talents.

- **Training and development**

  Employee training is one of the critical areas for banking. The banking model is changing much faster than ever before. Public sector banks have set up their training institutes, where through the training program is organized. Still, there is a need to impart digital knowledge to the employees. Since the future of banking is going to be technology driven, banks should consider providing standardized and customized training program. Banks may explore having a tie-up with institutes like IIMs and IITs to provide customized training program oriented towards technology. Some of the private sector banks like ICICI, Axis bank have a tie-up with academic institutes to offer training and certificate program.

- **Learning and development**

  Banks hire undergraduates as clerical staff or as trainees. They are concerned about pursuing higher studies after gaining 2 or 3 years of work experience. Banks may provide opportunities for their employee to register for higher studies. For example, Axis bank

provides various learning platforms such as classroom programs, external training programs, certification programs, and e-learning modules. It also has a tie-up with reputed institutes to offer Leadership development program, Executive development, and middle management training program. It also has tied with MOOCS provider course – the world's largest education company. Through this tie up the bank offers customized courses from leading global universities at an affordable cost. The primary objective is to develop skills based on leadership, big data, analytics, and customer service. Similarly, ICICI and HDFC bank has a tie-up with various institutes to provide learning opportunities for their employees.

- **Lateral recruitment**

  Private sector banks have the flexibility of hiring from campuses and sourcing from the market for any lateral jobs. Most of the private sector banks go to campuses for recruitment. Public sector banks meet the lateral requirement by internally promoting the employees. Though this system has yield better results in the past, these banks face constraints when it comes to hiring for specific skills. For instance, a bank needs a tech-savvy employee to work on new technologies like artificial intelligence, the blockchain, robots. Only a few public sector banks like SBI, Bank of Baroda and National Housing bank recruited from Indian Institutes of Management for roles in marketing, finance, operations, and sales. Other public sector banks can address this issue through an appropriate policy level change.

- **Performance management systems**

  A career in banking is one of the most sought opportunity for many job aspirants. In India, both public and private sectors banks have a structured Performance appraisal system. Despite the advantages, it leads to some element of subjectivity in assessment due to bias. Technology can play a significant role in the automation of the human resource system in general and performance management systems in particular. Internet or app-based software can be used to make the process instantaneous and transparent.

Prioritizing seniority over performance is not a good practice for attracting the best talent in a competitive environment. However, recruitment practices, as well as on-the-job training and redeployment, are considered as one of those many improvements of HR in the Indian banks. If policies linked to on job training, customised training programmes, competency mapping, professional development, promoting post-employment studies to employees, enhancing appraisal

system, providing skill specific compensation, reinvent the current recruitment system and like this such practices can be amended in existing policies of bank employees than positively bank employees productivity to any unforeseen situation can be enhanced.

7.3 Chapter Summary

The chapter summarizes the final objective of research where authors have presented a mitigation framework for the identified workforce challenges of Indian banking business. The suggested mitigation measures can address either one or a group of challenges. The mitigation measures are applicable at the bank and branch level. The mitigation measures are proposed after analyzing the existing policies of public and private sector banks.

CHAPTER 8

CONCLUSION, RECOMMENDATIONS & FUTURE SCOPE OF WORK

This chapter highlights the findings of the study, recommendations, limitations and future scope of work. The conclusion summarises the relevance and implications of the study concerning the banking business. This chapter creates a platform for carrying out further research to explore the influence of technology in banking and their workforce.

8.1 Key Findings

The significant findings of this study are listed below

- The banking industry has been going through radical change due to the influence of disruptive technologies such as digitization, the blockchain, data analytics, cybersecurity, artificial intelligence, cloud computing, and other financial technologies. These technological changes will have a strategic, financial and workforce-related impact on Indian banks.
- Ten significant workforce challenges were identified through extensive literature review, focus group discussion and assimilation of expert opinion. The identified workforce challenges are skill deficiencies, work management, employee's adaptability to change, career planning, performance management, training exposure, skill transformation, Employee compensation, compensation to meet advances and competency building.
- After performing impact analysis of these risk factors, it is found that the most crucial workforce challenges which are common to both public and private sector banks are compensation, career planning, employees adapatability to change, skill incentives/compensation. The most dominant challenge to the public sector banks is employee's adaptability to change. Skill deficiency is the major challenge for private sector banks.
- The fuzzy logic tool is applied to estimate workforce challenge index for both public and private sector banks. Public sector banks score a workforce challenge index of 2.132 and private banks workforce challenge index is 2.104. The cumulative effect of workforce challenge index across Indian bank is estimated as 2.114. The risk class of banking business is further estimated based on WCI value of all ten banks. Based on the WCI value of public

sector banks it reveals that public sector workforce challenges are approaching towards high challenge zone which itself is an alarming sign for the banks and that needs to addressed on priority.

- Private sector banks WCI value relatively falls under moderate zone as compared to public sector banks. However, the overall effect of Indian banks workforce challenge based on the index shows banks are facing a relatively moderate workforce challenge. It is due to the combined effect of public and private sector banks. The bank-wise challenge index is described and mentioned in the annexures between VIII-XVII.
- Banks need to instigate appropriate mitigation measures to address the challenges. The mitigation measures proposed are on the job training, outsourcing in value-added jobs, enhanced recruitment process for employees and compensation. The mitigations measures are skill development, enhanced training skills through practitioner trainers or training institutes, competency mapping for individual employees, hiring retired officials on contract for specific profiles.
- The model of banking business has been undergoing a progressive change in the era of digitization. The influx of technology in banking services has created a new demand for specific skills.

8.2 Recommendations

Technology is moving at a "warp speed," and human resource must keep up with speed. Technology will continue to be integral to all business functions, and banks must use technology to redefine the services to increase productivity. Some of the emerging trends that will have a significant impact on human resource and on its ability to deliver strategic human resource services are emerging technologies, the influence of outsourcing, and the increased focus on determining human resource's effectiveness.

Organisations all over are rushing to implement the latest ideas on management, sometimes to the point of overuse. The primary challenge for banks is to develop the social architecture that generates intellectual capital as the quite essential driver of change. Developing the individual or human capacity is an integral element of building capacity. Policies linked to on the job training, customized training programmes, competency mapping, professional development, promoting post-employment studies to employees, enhancing appraisal

system, providing skill specific compensation, reinvent the current recruitment system can be amended appropriately.

8.3 Limitations of the study

The significant limitations of the study are listed below

- This research is based on a sample of 10 major banks, i.e., 5 Public sector and 5 Private sector banks. The workforce challenge index is calculated based on the response collected from the employees representing the banks. However, the scope of the study may be expanded to include more banks.
- The scope of the study is limited to public and private sector banks which is a significant zone, whereas foreign banks that cover 9% of the total banking business is not covered in the study and can be covered in upcoming studies.
- The study has identified the workforce challenges related to technological disruption. However, some other internal and external factors may influence the workforce challenges needs to cover. The study does not cover the effect of technology on banking business financial aspect, Instead, it focuses only on the challenges and its effect on bank workforce.

8.4 Future Scope of work

This study is confined to the identification of workforce challenges related to technology disruption. The scope of the study is limited to Public and Private sector banks. Further studies can be undertaken to study the impact of technology on small and medium-size banks, Regional rural banks and cooperative banks. Also individual study can be performed to check technology disruptions impacts on strategic, operational and financial impacts on banking business.

8.5 Concluder Remarks

The influence of technology in banking has changed the fundamentals of the banking business model and the nature of work. The industry that has been one of the largest employers is moving towards technology-enabled services. The emergence of Block Chain, Robotics, and Artificial Intelligence is expected to change the basics of banking. This progressive change in technology could undoubtedly benefit the banking industry.

At the outset, these developments provide alternative forms of banking services like mobile wallet, peer to peer lending and other digital payment services. It is essential for banks to adopt every new technology that emerges to remain stable in the competitive arena. Simultaneously, adopting new technology poses various challenges related to the workforce. These challenges include training the existing workforce, addressing the skill gap, attracting talents and sourcing for specific skills, redefining the job role and leveraging the technology to optimize the cost of operations. Therefore banks need to define the role of human resources in the overall technology transformation.

The depth, breadth, and complexity of the workforce of the future for banking will bring some entirely new challenges. Managing talent will take on a whole new dimension and require different and innovative practices. Behavioral change needs to be embedded in managers to enable the right cultural shifts in this rapidly changing environment. Managers must be equipped to manage the external workforce through intermediaries or digital toolsets.

The various workforce issues laid out in this challenge also represent opportunities. By adopting a focused and flexible workforce strategy, and developing an organization that is customer-focused and digitally capable, a bank can build its brand, both internally and externally. Creating an environment that allows for employees to create their career brand across functions, while at the same time fostering work-life integration, innovative work environments, opportunities for challenging work and opportunities for advancement, is critical. Additionally, digital innovations will require the workforce to be more diverse and agile regarding adapting to new roles over time, and banks will need to focus on hiring those with broader skill.

CHAPTER 9

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Annexure I- Workforce Challenges Identification Questionnaire

Do you Think that these Challenging Factors are affecting Indian Banking workforce?	Assessment variables	Yes	No
Compliance Management	Compliance Management		
Employee Cost	Increase in Employee cost		
Training Exposure	Training Effectiveness		
	Training Needs		
	Training Support		
Cyber Security	Cyber Security		
Competition Management	Threats Of Startups		
	Emergence Of Alternate Career Choice		
Customer Complaint	Preparedness To Handle Customer Complaint		
	Meeting Customer Needs		
Work Management	Work Efficiency		
	Work-Life Balance		
Organizational Agility	Adequacy		
	Preparedness		
Compensation Management	Structured Approach For Recruitment Planning		
Recruitment Planning	Recruitment Model/Strategy		
Career Planning	Career Progression		
	Job Reduction		
Performance Management	Transparency		
	KRA's		
Identifying Deficit Skill Set	Skill Deficiency		
Skill Transformation	Skill Upgradation		
	Skill Development		
Demography	Demographic Dividend		

Annexure II- Subjective Questionnaire for WCI Index Estimation

1. **Name of Respondent**

2. Gender

3. Age of Respondent

4. Name of the bank

5. Years of experience with banks

6. How associated with bank

7. Do you feel bank is exposed to technology up gradations?

Factor/ Parameter	Low Challenge(score 1)	Moderate Challenge(score 2)	High Challenge (score 3)	Very High Challenge (score 4)	Extreme Challenge (score 5)
Increase in Employee salary based on skills	The annual salary hike is higher than the peers and industry average growth rate in salary	The annual salary hike is at par with the peers and industry average growth rate in salary	The annual salary hike is less than 5 % of the peers and industry average growth rate in salary	The annual salary hike is less than 8 % of the peers and industry average growth rate in salary	The annual salary hike is less than 10% of the peers and industry average growth rate in salary
Employee compensation	when the average compensation cost of tech-savvy employees is 5-7 Lacs	when the average compensation cost of tech-savvy employees is 7-10 Lacs	when the average compensation cost of tech-savvy employees is 10-12 Lacs	when the average compensation cost of tech-savvy employees is 12-15 Lacs	when the average compensation cost of tech-savvy employees is above 15 Lacs
Training Needs	Training on advanced technology is provided before its implementation	Training on advanced technology is given after one month of the new technological system introduced	Training on advanced technology is given after three months of the new technological system introduced	Training on advanced technology is given after six months of the new technological system introduced	Training on advanced technology is not given at all who introduced as a part of the system

Training Effectiveness	The training program provided by the organization meets 90 -100 % of the training needs of the employee.	The training program provided by the organization meets 85 -90 % of the training needs of the employee.	The training program provided by the organization meets 80 - 85 % of the training needs of the employee.	The training program provided by the organization meets 75 - 80 % of the training needs of the employee.	The training program provided by the organization meets less than 75% of training needs
Training support	While implementing new technology, on the job training and their necessary resources are provided for at least 30 days.	While implementing new technology, on the job training and their necessary resources are provided between 20 - 30 days	While implementing new technology, on the job training and their necessary resources are provided between 15 - 20 days	While implementing new technology, on the job training and their necessary resources are provided between 10 - 15 days	While implementing new technology, on the job training and their necessary resources are provided for less than ten days
Work-life Balance	No of extended hours spent in an organization up to 3 Hours per week	No of extended hours spent in an organization between 3-5 Hours per week	No of extended hours spent in an organization between 5-8 Hours per week	No of extended hours spent in an organization between 8-10 Hours per week	No of extended hours spent in an organization more than 10 Hours per week
Work Efficiency	With the advent of technology, the employee can save more than 10 Hours in a week	With the advent of technology, the employee can save 5-10 Hours in a week	With the advent of technology, the employee can save 2-5 Hours in a week	With the advent of technology, the employee can save 0-2 Hours in a week	With the advent of technology, the employee cannot save time even end up working for more no of hours
Employee Adaptability to change- Adequacy	Implementation of new technology has led to an increase in employee productivity by more than 10 %	Implementation of new technology has led to an increase in employee productivity between 8 - 10%	Implementation of new technology has led to an increase in employee productivity between 6-8%	Implementation of new technology has led to an increase in employee productivity between 4-6%	Implementation of new technology has led to an increase in employee productivity less than 4 %
Employee Adaptability to change - Preparedness	Change initiatives concerning absorption of new technology have been implemented and reviewed for its effectiveness across 90 % to 100 % of branches.	Change initiatives concerning absorption of new technology have been implemented and reviewed for its effectiveness across 80 % to 90 % of branches.	Change initiatives concerning absorption of new technology have been implemented and reviewed for its effectiveness across 70 % to 80 % of branches.	Change initiatives concerning absorption of new technology have been implemented and reviewed for its effectiveness across 65 % to 70 % of branches.	Change initiatives concerning absorption of new technology have been implemented and reviewed only in less than 65 % of branches.

Compensation Planning	Compensation plan meets 90 - 100 % of skills required for general and specific functions	Compensation plan meets 80- 90 % of skills required for general and specific functions	Compensation plan meets 75- 80 % of skills required for general and specific functions	Compensation plan meets 70 - 75 % of skills required for general and specific functions	Compensation plan meets less than 70 % of skills required for general and specific functions
Compensation Model	The compensation model has a structured approach to identify the human resource needs and meets 90 -100 % of skill requirements	The compensation model has a structured approach to identify the human resource needs and meets 85 -90 % of skill requirements	The compensation model has a structured approach to identify the human resource needs and meets 90 -100 % of skill requirements	The compensation model has a structured approach to identify the human resource needs and meets 90 -100 % of skill requirements	The compensation model has a structured approach to identify the human resource needs and meets 90 -100 % of skill requirements
Career Progression	The perception of employees concerning career progression is between 80 - 90 %	The perception of employees concerning career progression is between 70 -80 %	The perception of employees concerning career progression is between 65 -70 %	The perception of employees concerning career progression is between 60 -65 %	The perception of employees concerning career progression is less than 60%
Job Reduction	An average number of jobs that becomes redundant due to the influence of technology is less than 500 employees.	Average number of jobs that becomes redundant due to the influence of technology is between 500-600 employees	Average number of jobs that becomes redundant due to the influence of technology is between 600-700 employees	Average number of jobs that becomes redundant due to the influence of technology is between 700-800 employees	Average number of jobs that becomes redundant due to the influence of technology is more than 800 employees
Skill upgradation	Due to technological development does skill enhancement needed once in 3 year	Due to technological development does skill enhancement needed once in 2 year	Due to technological development does skill enhancement needed once in 1 year	Due to technological development does skill enhancement needed twice in a year	Due to technological development does skill enhancement needed more than twice in a year
Skill Deficiency	The percentage of jobs that need to be outsourced due to lack of technical skill is less than 10 %	The percentage of jobs that need to be outsourced due to lack of technical skill is between 10 - 15 %	The percentage of jobs that need to be outsourced due to lack of technical skill is between 15-20%	The percentage of jobs that need to be outsourced due to lack of technical skill is between 20-25%	The percentage of jobs that need to be outsourced due to lack of technical skill is between 25-30%
Skill Development	The training programs conducted in a year meets 80 - 90 % of training budgets and targeted training person days	The training programs conducted in a year meet 70- 80 % of training budgets and targeted training person days	The training programs conducted in a year meets 65- 70% of training budgets and targeted training person days	The training programs conducted in a year meet 60 - 55 % of training budgets and targeted training person days	The training programs conducted in a year met less than 65 % of training budgets and targeted training person days

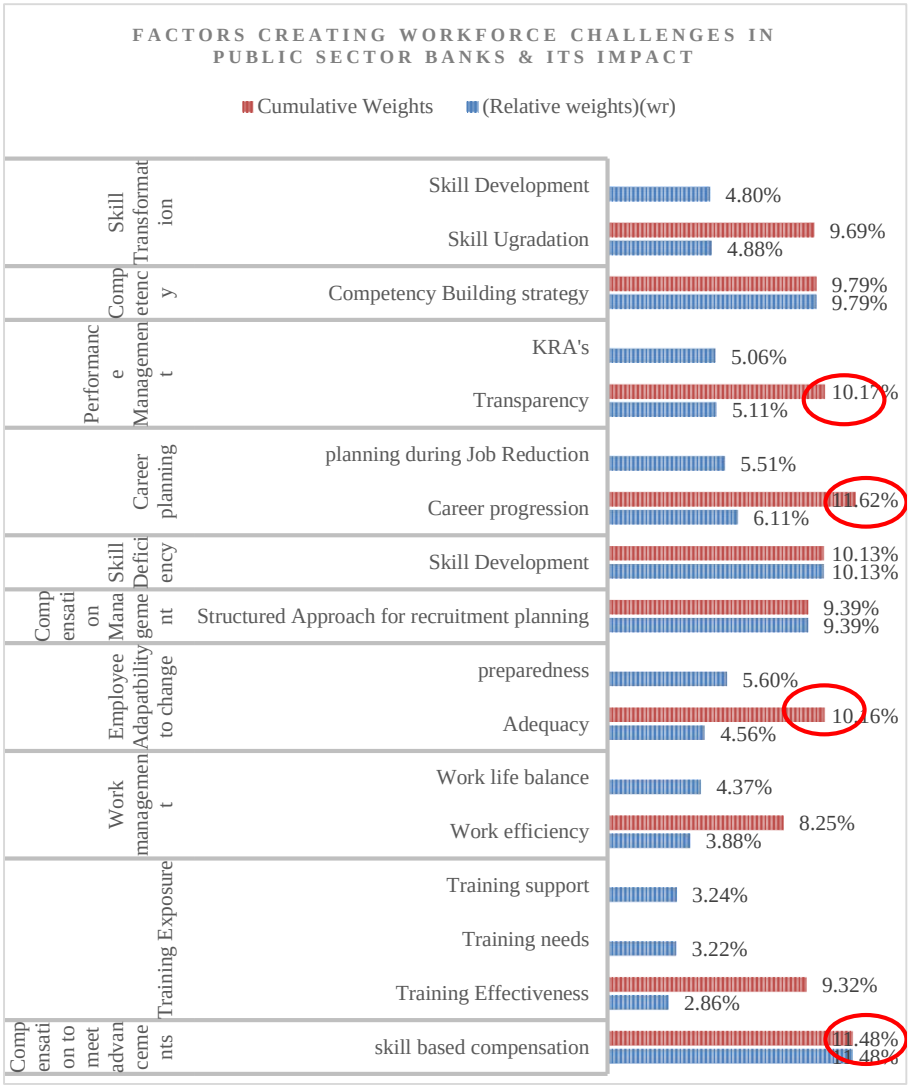
Transparency	The perception of employees concerning the organization being fair in performance appraisal is between 80 -90 %	The perception of employees concerning the organization being fair in performance appraisal is between 70 -80 %	The perception of employees concerning the organization being fair in performance appraisal is between 65-70 %	The perception of employees concerning the organization being fair in performance appraisal is between 60 -65%	The perception of employees concerning the organization being fair in performance appraisal is less than 60 %
KRA's	employees at all levels understand their KRA's and percentage of employees who achieve their targets are between 80 to 90 %	employees at all levels understand their KRA's and percentage of employees who achieve their targets are between 70 to 80 %	employees at all levels understand their KRA's and percentage of employees who achieve their targets are between 65 to 70 %	employees at all levels understand their KRA's and percentage of employees who achieve their targets are between 60 to 65 %	employees at all levels understand their KRA's and percentage of employees who achieve their targets are less than 60 %

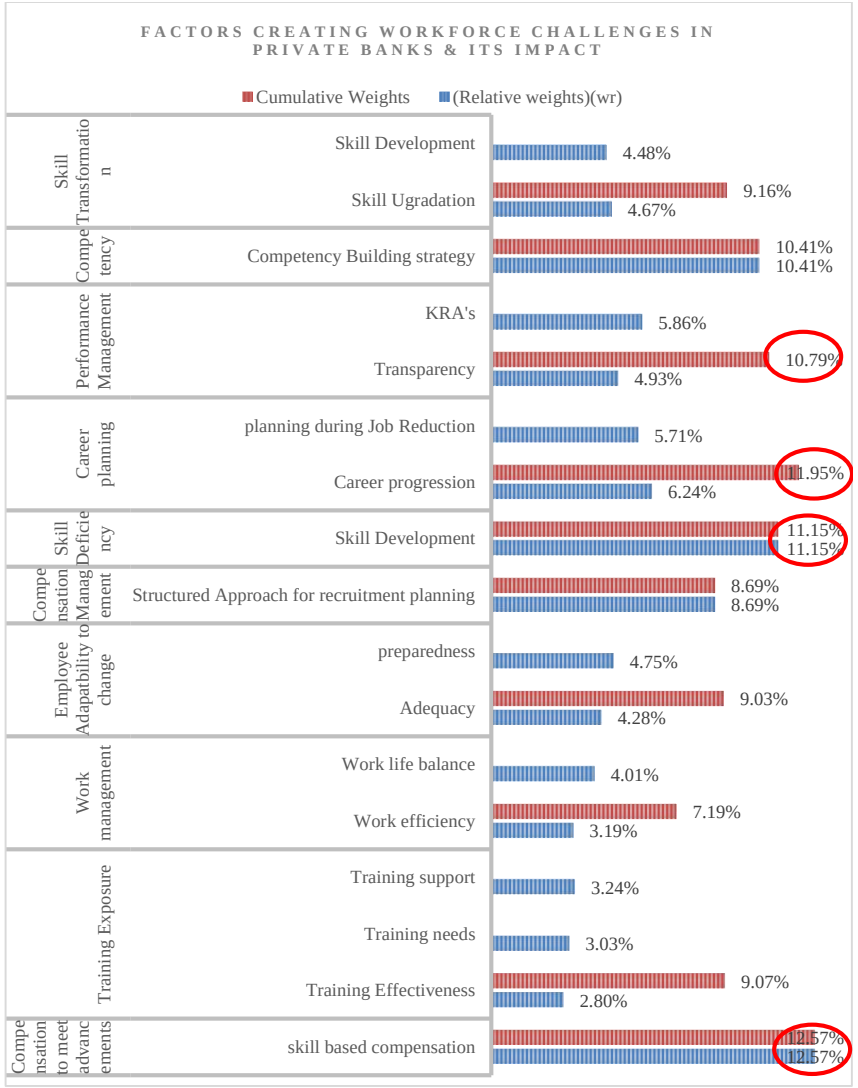
Annexure III- Public Sector Banks Respondent's Responses

Assessment Factor	Assessment variables	no of 1s	no of 2s	no of 3s	no of 2s	no of 5	Total Respondents	Weighted Sum(IN1+2N2+3N3+2N2+5N5)	Weighted Average(WA)	Rating (r_i)	Weight(w)=Rating(r_i)*weighted average (w_A)	(Relative weights)(w_r)
Compensation to meet advancements	skill based compensation	23	63	64	93	76	319	907	2.8433	0.1000	0.2843	11.48%
Training Exposure	Training Effectiveness	74	132	41	48	24	319	677	2.1223	0.0333	0.0707	2.86%
	Training needs	50	75	86	78	30	319	764	2.3950	0.0333	0.0798	3.22%
	Training support	32	107	96	62	22	319	768	2.4075	0.0333	0.0803	3.24%
Work management	Work efficiency	93	105	29	75	13	315	605	1.9206	0.0500	0.0960	3.88%
	Work life balance	75	61	41	113	29	319	691	2.1661	0.0500	0.1083	4.37%
Employee Adaptability to change	Adequacy	49	81	83	90	16	319	720	2.2571	0.0500	0.1129	4.56%
	preparedness	23	28	102	110	56	319	885	2.7743	0.0500	0.1387	5.60%
Compensation Management	Structured Approach for compensation planning	60	53	71	104	31	319	742	2.3260	0.1000	0.2326	9.39%
Skill Deficiency	Skill Development	28	122	82	51	36	319	800	2.5078	0.1000	0.2508	10.13%
Career planning	Career progression	3	72	27	116	101	319	965	3.0251	0.0500	0.1513	6.11%
	planning during Job Reduction	17	56	45	133	68	319	870	2.7273	0.0500	0.1364	5.51%
Performance Management	Transparency	41	93	69	69	47	319	807	2.5298	0.0500	0.1265	5.11%
	KRA's	39	115	69	52	44	319	800	2.5078	0.0500	0.1254	5.06%
Competency	Competency Building strategy	33	124	63	64	35	319	773	2.4232	0.1000	0.2423	9.79%
Skill Transformation	Skill Ugradation	35	121	36	83	44	319	771	2.4169	0.0500	0.1208	4.88%
	Skill Development	53	108	57	62	39	319	759	2.3793	0.0500	0.1190	4.80%
											2.4761	100.00%

Annexure IV-Private Sector Banks Respondent's Response

Assessment Factor	Assessment variables	no of 1s	no of 2s	no of 3s	no of 2s	no of 5	Total Respondents	Weighted sum(IN1+2N2+3N3+2N2+5N5)	Weighted Average(WA)	Rating (r_i)	Weight(w)=Rating(r_i)*weighted average (w_A)	(Relative weights)(w_r)
Compensation to meet advancements	skill based compensation	24	108	70	23	91	316	951	3.0095	0.1000	0.3009	12.57%
Training Exposure	Training Effectiveness	77	178	39	8	14	316	636	2.0127	0.0333	0.0671	2.80%
	Training needs	95	100	90	11	20	316	687	2.1741	0.0333	0.0725	3.03%
	Training support	47	155	76	13	25	316	736	2.3291	0.0333	0.0776	3.24%
Work management	Work efficiency	172	60	22	62	0	316	482	1.5253	0.0500	0.0763	3.19%
	Work life balance	127	16	50	106	17	316	606	1.9177	0.0500	0.0959	4.01%
Employee Adapatbility to change	Adequacy	111	22	90	81	12	316	647	2.0475	0.0500	0.1024	4.28%
	preparedness	90	9	114	82	21	316	719	2.2753	0.0500	0.1138	4.75%
Compensation Management	Structured Approach for compensation planning	114	15	73	92	22	316	657	2.0791	0.1000	0.2079	8.69%
Skill Deficiency	Skill Development	18	170	64	9	55	316	843	2.6677	0.1000	0.2668	11.15%
Career planning	Career progression	4	153	34	31	94	316	944	2.9873	0.0500	0.1494	6.24%
	planning during Job Reduction	12	161	39	36	68	316	863	2.7310	0.0500	0.1366	5.71%
Performance Management	Transparency	51	148	83	7	27	316	745	2.3576	0.0500	0.1179	4.93%
	KRA's	26	144	74	3	69	316	887	2.8070	0.0500	0.1403	5.86%
Competency	Competency Building strategy	27	160	74	19	36	316	787	2.4905	0.1000	0.2491	10.41%
Skill Transformation	Skill Ugradation	62	167	32	20	35	316	707	2.2373	0.0500	0.1119	4.67%
	Skill Development	84	150	37	14	31	316	678	2.1456	0.0500	0.1073	4.48%
											2.3935	100.00%





Annexure V – Weights Of Various Factors in Public and Private Sector Banks

Annexure VI- Public sector banks WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= w_r* AF	Membership Degree Matrix (MD)				
Compensation to meet advancements	**skill based compensation**	**11.48%**	**11.48%**	**2**	**0**	**1**	**0**	**0**	**0**		0.8	1	0.5	0.2	0		0.0919	0.1148	0.0574	0.0230	0.0000
Training Exposure	**Training Effectiveness**	**2.86%**	**9.32%**	**5**	**0**	**0**	**0**	**0**	**1**		0	0	0.2	0.4	1		0.0000	0.0000	0.0057	0.0114	0.0286
	Training needs	**3.22%**		**4**	**0**	**0**	**0**	**1**	**0**		0	0	0.6	1	0.4		0.0000	0.0000	0.0193	0.0322	0.0129
	Training support	**3.24%**		**4**	**0**	**0**	**0**	**1**	**0**		0	0.5	1	0.5	0		0.0000	0.0162	0.0324	0.0162	0.0000
Work management	**Work efficiency**	**3.88%**	**8.25%**	**3**	**0**	**0**	**1**	**0**	**0**		0	0.3	1	0.7	0		0.0000	0.0116	0.0388	0.0271	0.0000
	Work-life balance	**4.37%**		**4**	**0**	**0**	**0**	**1**	**0**		0	0	0.9	1	0.1		0.0000	0.0000	0.0394	0.0437	0.0044
Employee Adaptability to change	**Adequacy**	**4.56%**	**10.16%**	**5**	**0**	**0**	**0**	**0**	**1**		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0273	0.0456
	preparedness	**5.60%**		**4**	**0**	**0**	**0**	**1**	**0**		0	0.2	0.5	1	0		0.0000	0.0112	0.0280	0.0560	0.0000
Compensation Management	**Structured Approach for compensation planning**	**9.39%**	**9.39%**	**5**	**0**	**0**	**0**	**0**	**1**		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0376	0.0939
Skill Deficiency	**Skill Development**	**10.13%**	**10.13%**	**3**	**0**	**0**	**1**	**0**	**0**		0	0.6	1	0.7	0		0.0000	0.0608	0.1013	0.0709	0.0000
Career planning	**Career progression**	**6.11%**	**11.62%**	**2**	**0**	**1**	**0**	**0**	**0**		0.4	1	0.5	0	0		0.0244	0.0611	0.0305	0.0000	0.0000
	planning during Job Reduction	**5.51%**		**4**	**0**	**0**	**0**	**1**	**0**		0	0	0.6	1	0.5		0.0000	0.0000	0.0330	0.0551	0.0275
Performance Management	**Transparency**	**5.11%**	**10.17%**	**2**	**0**	**1**	**0**	**0**	**0**		0.6	1	0.5	0	0		0.0307	0.0511	0.0255	0.0000	0.0000
	KRA's	**5.06%**		**3**	**0**	**0**	**1**	**0**	**0**		0	0.8	1	0.6	0		0.0000	0.0405	0.0506	0.0304	0.0000
Competency	**Competency Building strategy**	**9.79%**	**9.79%**	**4**	**0**	**0**	**0**	**1**	**0**		0	0	0.5	1	0.6		0.0000	0.0000	0.0489	0.0979	0.0587
Skill Transformation	**Skill Ugradation**	**4.88%**	**9.69%**	**5**	**0**	**0**	**0**	**0**	**1**		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0439	0.0488
	Skill Development	**4.80%**		**4**	**0**	**0**	**0**	**1**	**0**		0	0	0.4	1	0.3		0.0000	0.0000	0.0192	0.0480	0.0144
																	0.0136	0.0293	0.0358	0.0367	0.0196
																	0.0215	0.0326	0.0363	0.0282	0.1185
																	A12	A23	A34	A45	AT
																	0.25181557				
																	2.124985748				
																	WCI				

Annexure VII- Private Sector banks WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= w_r* AF	Membership Degree Matrix (MD)				
Compensation to meet advancements	**skill based compensation**	**12.57%**	**12.57%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.1006	0.1257	0.0629	0.0251	0.0000
Training Exposure	**Training Effectiveness**	**2.80%**	**9.07%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0056	0.0112	0.0280
	Training needs	**3.03%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0182	0.0303	0.0121
	Training support	**3.24%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0162	0.0324	0.0162	0.0000
Work management	**Work efficiency**	**3.19%**	**7.19%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0096	0.0319	0.0223	0.0000
	Work-life balance	**4.01%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0361	0.0401	0.0040
Employee Adapatbility to change	**Adequacy**	**4.28%**	**9.03%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0257	0.0428
	preparedness	**4.75%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0095	0.0238	0.0475	0.0000
Compensation Management	**Structured Approach for compensation planning**	**8.69%**	**8.69%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0347	0.0869
Skill Deficiency	**Skill Development**	**11.15%**	**11.15%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0669	0.1115	0.0780	0.0000
Career planning	**Career progression**	**6.24%**	**11.95%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0250	0.0624	0.0312	0.0000	0.0000
	planning during Job Reduction	**5.71%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0342	0.0571	0.0285
Performance Management	**Transparency**	**4.93%**	**10.79%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0296	0.0493	0.0246	0.0000	0.0000
	KRA's	**5.86%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0469	0.0586	0.0352	0.0000
Competency	**Competency Building strategy**	**10.41%**	**10.41%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0520	0.1041	0.0624
Skill Transformation	**Skill Ugradation**	**4.67%**	**9.16%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0421	0.0467
	Skill Development	**4.48%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0179	0.0448	0.0134
																	0.0157	0.0336	0.0396	0.0385	0.0188
																	0.0246	0.0366	0.0390	0.0286	0.1289
																	A12	A23	A34	A45	AT
																	0.2723				
																	2.1117				
																	WCI				

Annexure VIII- State Bank of India WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= w_r* AF	Membership Degree Matrix (MD)				
					1	2	**3**	4	5		1	2	**3**	2	5		**1**	**2**	**3**	**2**	**5**
Future Prospects Analysis	**Prospects Assessment**	**10.19%**	**10.19%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.0815	0.1019	0.0510	0.0204	0.0000
Training Exposure	**Training Effectiveness**	**2.28%**	**9.23%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0046	0.0091	0.0228
	Training needs	**3.58%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0215	0.0358	0.0143
	Training support	**3.36%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0168	0.0336	0.0168	0.0000
Work management	**Work efficiency**	**4.93%**	**9.94%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0148	0.0493	0.0345	0.0000
	Work-life balance	**5.01%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0451	0.0501	0.0050
Employee Adaptability to change	**Adequacy**	**4.82%**	**10.39%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0289	0.0482
	preparedness	**5.56%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0111	0.0278	0.0556	0.0000
Compensation Management	**Structured Approach for recruitment planning**	**9.81%**	**9.81%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0392	0.0981
Competency	**Competency Building strategy**	**9.97%**	**9.97%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0598	0.0997	0.0698	0.0000
Career planning	**Career progression**	**5.73%**	**10.52%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0229	0.0573	0.0286	0.0000	0.0000
	planning during Job Reduction	**4.80%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0288	0.0480	0.0240
Performance Management	**Transparency**	**5.34%**	**10.30%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0321	0.0534	0.0267	0.0000	0.0000
	KRA's	**4.96%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0397	0.0496	0.0298	0.0000
Skill Deficiency	**Skill Deficiency**	**10.19%**	**10.19%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0510	0.1019	0.0612
Skill Transformation	**Skill Ugradation**	**4.96%**	**9.45%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0446	0.0496
	Skill Development	**4.49%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0180	0.0449	0.0135
																	0.0113	0.0264	0.0355	0.0378	0.0206
																	0.0189	0.0309	0.0367	0.0292	0.1157
																	A12	A23	A34	A45	AT
																	0.249099725				
																	2.153863872				
																	WCI				

Annexure IX- Canara Bank WCI Estimation

Assesment Factor	Assesment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= w_r* AF	Membership Degree Matrix (MD)				
					1	2	**3**	4	5		1	2	**3**	2	5		**1**	**2**	**3**	**2**	**5**
FutureProspects Analysis	**Prospects Assesment**	**11.00%**	**11.00%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.0880	0.1100	0.0550	0.0220	0.0000
Training Exposure	**Training Effectiveness**	**2.78%**	**8.79%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0056	0.0111	0.0278
	Training needs	**2.94%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0176	0.0294	0.0118
	Training support	**3.07%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0154	0.0307	0.0154	0.0000
Work management	**Work efficiency**	**3.39%**	**7.40%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0102	0.0339	0.0238	0.0000
	Work-life balance	**4.00%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0360	0.0400	0.0040
Employee Adapatbility to change	**Adequacy**	**4.44%**	**9.85%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0266	0.0444
	preparedness	**5.41%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0108	0.0271	0.0541	0.0000
Compensation Management	**Structured Approach for recruitment planning**	**8.99%**	**8.99%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0359	0.0899
Competency	**Competency Building strategy**	**9.39%**	**9.39%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0563	0.0939	0.0657	0.0000
Career planning	**Career progression**	**5.73%**	**11.18%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0229	0.0573	0.0287	0.0000	0.0000
	planning during Job Reduction	**5.45%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0327	0.0545	0.0272
Performance Management	**Transparency**	**5.69%**	**11.54%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0341	0.0569	0.0284	0.0000	0.0000
	KRA's	**5.85%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0468	0.0585	0.0351	0.0000
Skill Deficeincy	**Skill Deficiency**	**10.63%**	**10.63%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0532	0.1063	0.0638
Skill Transformation	**Skill Ugradation**	**5.45%**	**11.23%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0490	0.0545
	Skill Development	**5.79%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0231	0.0579	0.0174
																	0.0129	0.0281	0.0347	0.0363	0.0196
																	0.0205	0.0314	0.0355	0.0280	0.1153
																	A12	A23	A34	A45	AT
																	0.245565973				
																	2.130026162				
																	WCI				

Annexure X- Punjab National Bank WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD=w.*	Membership Degree Matrix (MD)				
					1	2	**3**	4	5		1	2	**3**	2	5		**1**	**2**	**3**	**2**	**5**
Future Prospects Analysis	**Prospects Assessment**	**11.29%**	**11.29%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.0903	0.1129	0.0565	0.0226	0.0000
Training Exposure	**Training Effectiveness**	**3.06%**	**9.35%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0061	0.0122	0.0306
	Training needs	**3.08%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0185	0.0308	0.0123
	Training support	**3.22%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0161	0.0322	0.0161	0.0000
Work management	**Work efficiency**	**3.32%**	**7.63%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0100	0.0332	0.0232	0.0000
	Work-life balance	**4.31%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0388	0.0431	0.0043
Employee Adapatbility to change	**Adequacy**	**4.21%**	**9.38%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0253	0.0421
	preparedness	**5.17%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0103	0.0258	0.0517	0.0000
Compensation Management	**Structured Approach for recruitment planning**	**8.35%**	**8.35%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0334	0.0835
Competency	**Competency Building strategy**	**11.09%**	**11.09%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0665	0.1109	0.0776	0.0000
Career planning	**Career progression**	**6.36%**	**12.70%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0255	0.0636	0.0318	0.0000	0.0000
	planning during Job Reduction	**6.33%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0380	0.0633	0.0317
Performance Management	**Transparency**	**5.13%**	**10.68%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0308	0.0513	0.0257	0.0000	0.0000
	KRA's	**5.54%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0443	0.0554	0.0333	0.0000
Skill Deficeincy	**Skill Deficiency**	**10.33%**	**10.33%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0517	0.1033	0.0620
Skill Transformation	**Skill Ugradation**	**4.55%**	**9.20%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0410	0.0455
	Skill Development	**4.65%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0186	0.0465	0.0140
																	0.0134	0.0307	0.0387	0.0387	0.0187
																	0.0220	0.0347	0.0387	0.0287	0.1241
																	A12	A23	A34	A45	AT
																	0.264849808				
																	2.134382443				
																	WCI				

Annexure XI- Axis Bank WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix				
					1	2	**3**	4	5
Future Prospects Analysis	**Prospects Assessment**	**10.39%**	**10.39%**	2	0	1	**0**	0	0
Training Exposure	**Training Effectiveness**	**2.52%**	**8.42%**	5	0	0	**0**	0	1
	Training needs	**2.95%**		4	0	0	**0**	1	0
	Training support	**2.95%**		3	0	0	**1**	0	0
Work management	**Work efficiency**	**3.59%**	**7.71%**	3	0	0	**1**	0	0
	Work-life balance	**4.12%**		4	0	0	**0**	1	0
Employee Adaptability to change	**Adequacy**	**4.12%**	**9.21%**	5	0	0	**0**	0	1
	preparedness	**5.09%**		4	0	0	**0**	1	0
Compensation Management	**Structured Approach for recruitment planning**	**8.31%**	**8.31%**	5	0	0	**0**	0	1
Competency	**Competency Building strategy**	**12.87%**	**12.87%**	3	0	0	**1**	0	0
Career planning	**Career progression**	**6.84%**	**12.73%**	2	0	1	**0**	0	0
	planning during Job Reduction	**5.90%**		4	0	0	**0**	1	0
Performance Management	**Transparency**	**4.69%**	**10.99%**	2	0	1	**0**	0	0
	KRA's	**6.30%**		3	0	0	**1**	0	0
Skill Deficiency	**Skill Deficiency**	**10.45%**	**10.45%**	4	0	0	**0**	1	0
Skill Transformation	**Skill Ugradation**	**4.59%**	**8.91%**	5	0	0	**0**	0	1
	Skill Development	**4.32%**		4	0	0	**0**	1	0

AF=I * RF

AF matrix				
1	2	**3**	2	5
0.8	1	0.5	0.2	0
0	0	0.2	0.4	1
0	0	0.6	1	0.4
0	0.5	1	0.5	0
0	0.3	1	0.7	0
0	0	0.9	1	0.1
0	0	0	0.6	1
0	0.2	0.5	1	0
0	0	0	0.4	1
0	0.6	1	0.7	0
0.4	1	0.5	0	0
0	0	0.6	1	0.5
0.6	1	0.5	0	0
0	0.8	1	0.6	0
0	0	0.5	1	0.6
0	0	0	0.9	1
0	0	0.4	1	0.3

MD= w_r* AF

Membership Degree Matrix (MD)				
1	**2**	**3**	**2**	**5**
0.0831	0.1039	0.0519	0.0208	0.0000
0.0000	0.0000	0.0050	0.0101	0.0252
0.0000	0.0000	0.0177	0.0295	0.0118
0.0000	0.0147	0.0295	0.0147	0.0000
0.0000	0.0108	0.0359	0.0251	0.0000
0.0000	0.0000	0.0371	0.0412	0.0041
0.0000	0.0000	0.0000	0.0247	0.0412
0.0000	0.0102	0.0255	0.0509	0.0000
0.0000	0.0000	0.0000	0.0332	0.0831
0.0000	0.0772	0.1287	0.0901	0.0000
0.0273	0.0684	0.0342	0.0000	0.0000
0.0000	0.0000	0.0354	0.0590	0.0295
0.0281	0.0469	0.0235	0.0000	0.0000
0.0000	0.0504	0.0630	0.0378	0.0000
0.0000	0.0000	0.0523	0.1045	0.0627
0.0000	0.0000	0.0000	0.0413	0.0459
0.0000	0.0000	0.0173	0.0432	0.0130
0.0118	0.0321	0.0425	0.0411	0.0181
0.0220	0.0373	0.0418	0.0296	0.1307
A12	A23	A34	A45	AT
0.281154931				
2.151827801				
WCI				

Annexure XII- Central Bank of India WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= w_r* AF	Membership Degree Matrix (MD)				
					1	2	**3**	4	5		1	2	**3**	2	5		**1**	**2**	**3**	**2**	**5**
Future Prospects Analysis	**Prospects Assessment**	**12.18%**	**12.18%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.0974	0.1218	0.0609	0.0244	0.0000
Training Exposure	**Training Effectiveness**	**3.03%**	**9.57%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0061	0.0121	0.0303
	Training needs	**3.21%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0193	0.0321	0.0128
	Training support	**3.32%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0166	0.0332	0.0166	0.0000
Work management	**Work efficiency**	**3.64%**	**7.95%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0109	0.0364	0.0255	0.0000
	Work-life balance	**4.31%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0388	0.0431	0.0043
Employee Adaptability to change	**Adequacy**	**4.68%**	**10.80%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0281	0.0468
	preparedness	**6.12%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0122	0.0306	0.0612	0.0000
Compensation Management	**Structured Approach for recruitment planning**	**9.70%**	**9.70%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0388	0.0970
Competency	**Competency Building strategy**	**9.37%**	**9.37%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0562	0.0937	0.0656	0.0000
Career planning	**Career progression**	**6.66%**	**12.28%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0266	0.0666	0.0333	0.0000	0.0000
	planning during Job Reduction	**5.62%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0337	0.0562	0.0281
Performance Management	**Transparency**	**4.78%**	**9.47%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0287	0.0478	0.0239	0.0000	0.0000
	KRA's	**4.68%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0375	0.0468	0.0281	0.0000
Skill Deficiency	**Skill Deficiency**	**9.57%**	**9.57%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0478	0.0957	0.0574
Skill Transformation	**Skill Ugradation**	**4.75%**	**9.13%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0427	0.0475
	Skill Development	**4.38%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0175	0.0438	0.0131
																	0.0150	0.0303	0.0350	0.0363	0.0202
																	0.0226	0.0326	0.0356	0.0282	0.1191
																	A12	A23	A34	A45	AT
																	0.251264691				
																	2.109189856				

Annexure XIII- HDFC Bank WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= w_r* AF	Membership Degree Matrix (MD)				
					1	2	**3**	4	5		1	2	**3**	2	5		**1**	**2**	**3**	**2**	**5**
Future Prospects Analysis	**Prospects Assessment**	**14.29%**	**14.29%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.1143	0.1429	0.0715	0.0286	0.0000
Training Exposure	**Training Effectiveness**	**2.60%**	**8.50%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0052	0.0104	0.0260
	Training needs	**2.66%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0160	0.0266	0.0106
	Training support	**3.24%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0162	0.0324	0.0162	0.0000
Work management	**Work efficiency**	**3.22%**	**7.31%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0097	0.0322	0.0225	0.0000
	Work-life balance	**4.09%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0368	0.0409	0.0041
Employee Adaptability to change	**Adequacy**	**4.54%**	**10.01%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0272	0.0454
	preparedness	**5.47%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0109	0.0274	0.0547	0.0000
Compensation Management	**Structured Approach for recruitment planning**	**9.01%**	**9.01%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0360	0.0901
Competency	**Competency Building strategy**	**10.75%**	**10.75%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0645	0.1075	0.0752	0.0000
Career planning	**Career progression**	**5.70%**	**11.33%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0228	0.0570	0.0285	0.0000	0.0000
	planning during Job Reduction	**5.63%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0338	0.0563	0.0282
Performance Management	**Transparency**	**4.80%**	**10.40%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0288	0.0480	0.0240	0.0000	0.0000
	KRA's	**5.60%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0448	0.0560	0.0336	0.0000
Skill Deficiency	**Skill Deficiency**	**10.36%**	**10.36%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0518	0.1036	0.0622
Skill Transformation	**Skill Ugradation**	**4.06%**	**8.05%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0365	0.0406
	Skill Development	**3.99%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0160	0.0399	0.0120
																	0.0190	0.0368	0.0406	0.0393	0.0193
																	0.0279	0.0387	0.0400	0.0293	0.1360
																	A12	A23	A34	A45	AT
																	0.283958412				
																	2.088560883				
																	WCI				

Annexure XIV- ICICI Bank WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= w_r* AF	Membership Degree Matrix (MD)				
					1	2	**3**	4	5		1	2	**3**	2	5		**1**	**2**	**3**	**2**	**5**
Future Prospects Analysis	**Prospects Assessment**	**16.53%**	**16.53%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.1322	0.1653	0.0826	0.0331	0.0000
Training Exposure	**Training Effectiveness**	**2.70%**	**8.56%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0054	0.0108	0.0270
	Training needs	**2.70%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0162	0.0270	0.0108
	Training support	**3.17%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0158	0.0317	0.0158	0.0000
Work management	**Work efficiency**	**2.29%**	**5.28%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0069	0.0229	0.0160	0.0000
	Work-life balance	**2.99%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0269	0.0299	0.0030
Employee Adaptability to change	**Adequacy**	**2.64%**	**5.98%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0158	0.0264
	preparedness	**3.34%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0067	0.0167	0.0334	0.0000
Compensation Management	**Structured Approach for recruitment planning**	**5.28%**	**5.28%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0211	0.0528
Competency	**Competency Building strategy**	**12.66%**	**12.66%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0760	0.1266	0.0886	0.0000
Career planning	**Career progression**	**5.98%**	**11.96%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0239	0.0598	0.0299	0.0000	0.0000
	planning during Job Reduction	**5.98%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0359	0.0598	0.0299
Performance Management	**Transparency**	**5.45%**	**12.84%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0327	0.0545	0.0273	0.0000	0.0000
	KRA's	**7.39%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0591	0.0739	0.0443	0.0000
Skill Deficiency	**Skill Deficiency**	**13.36%**	**13.36%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0668	0.1336	0.0802
Skill Transformation	**Skill Ugradation**	**3.87%**	**7.56%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0348	0.0387
	Skill Development	**3.69%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0148	0.0369	0.0111
																	0.0251	0.0487	0.0530	0.0468	0.0171
																	0.0369	0.0508	0.0499	0.0320	0.1696
																	A12	A23	A34	A45	AT
																	0.352188727				
																	2.076591188				
																	WCI				

Annexure XV- Kotak bank WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= w_r* AF	Membership Degree Matrix (MD)				
					1	2	**3**	4	5		1	2	**3**	2	5		**1**	**2**	**3**	**2**	**5**
Future Prospects Analysis	**Prospects Assessment**	**10.32%**	**10.32%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.0826	0.1032	0.0516	0.0206	0.0000
Training Exposure	**Training Effectiveness**	**3.21%**	**10.39%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0064	0.0128	0.0321
	Training needs	**3.63%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0218	0.0363	0.0145
	Training support	**3.55%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0177	0.0355	0.0177	0.0000
Work management	**Work efficiency**	**3.27%**	**7.90%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0098	0.0327	0.0229	0.0000
	Work-life balance	**4.63%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0416	0.0463	0.0046
Employee Adaptability to change	**Adequacy**	**5.32%**	**9.85%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0319	0.0532
	preparedness	**4.53%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0091	0.0227	0.0453	0.0000
Compensation Management	**Structured Approach for recruitment planning**	**11.08%**	**11.08%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0443	0.1108
Competency	**Competency Building strategy**	**8.88%**	**8.88%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0533	0.0888	0.0621	0.0000
Career planning	**Career progression**	**6.33%**	**12.02%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0253	0.0633	0.0316	0.0000	0.0000
	planning during Job Reduction	**5.70%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0342	0.0570	0.0285
Performance Management	**Transparency**	**4.91%**	**9.60%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0295	0.0491	0.0246	0.0000	0.0000
	KRA's	**4.69%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0375	0.0469	0.0281	0.0000
Skill Deficiency	**Skill Deficiency**	**7.93%**	**7.93%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0397	0.0793	0.0476
Skill Transformation	**Skill Ugradation**	**6.11%**	**12.02%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0550	0.0611
	Skill Development	**5.92%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0237	0.0592	0.0178
																	0.0116	0.0249	0.0300	0.0324	0.0223
																	0.0182	0.0275	0.0312	0.0273	0.1043
																	A12	A23	A34	A45	AT
																	0.221457165				
																	2.124263897				
																	WCI				

Annexure XVI- Yes bank WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= w_r* AF	Membership Degree Matrix (MD)				
					1	2	3	4	5		1	2	3	2	5		1	2	3	2	5
Future Prospects Analysis	Prospects Assessment	11.61%	11.61%	2	0	1	0	0	0		0.8	1	0.5	0.2	0		0.0929	0.1161	0.0580	0.0232	0.0000
Training Exposure	Training Effectiveness	2.96%	9.42%	5	0	0	0	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0059	0.0119	0.0296
	Training needs	3.16%		4	0	0	0	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0190	0.0316	0.0126
	Training support	3.29%		3	0	0	1	0	0		0	0.5	1	0.5	0		0.0000	0.0165	0.0329	0.0165	0.0000
Work management	Work efficiency	3.52%	7.63%	3	0	0	1	0	0		0	0.3	1	0.7	0		0.0000	0.0105	0.0352	0.0246	0.0000
	Work-life balance	4.11%		4	0	0	0	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0370	0.0411	0.0041
Employee Adaptability to change	Adequacy	4.61%	9.85%	5	0	0	0	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0277	0.0461
	preparedness	5.24%		4	0	0	0	1	0		0	0.2	0.5	1	0		0.0000	0.0105	0.0262	0.0524	0.0000
Compensationon Management	Structured Approach for recruitment planning	9.42%	9.42%	5	0	0	0	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0377	0.0942
Competency	Competency Building strategy	10.81%	10.81%	3	0	0	1	0	0		0	0.6	1	0.7	0		0.0000	0.0649	0.1081	0.0757	0.0000
Career planning	Career progression	6.37%	11.71%	2	0	1	0	0	0		0.4	1	0.5	0	0		0.0255	0.0637	0.0318	0.0000	0.0000
	planning during Job Reduction	5.34%		4	0	0	0	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0320	0.0534	0.0267
Performance Management	Transparency	4.81%	10.32%	2	0	1	0	0	0		0.6	1	0.5	0	0		0.0289	0.0481	0.0240	0.0000	0.0000
	KRA's	5.51%		3	0	0	1	0	0		0	0.8	1	0.6	0		0.0000	0.0440	0.0551	0.0330	0.0000
Skill Deficiency	Skill Deficiency	10.22%	10.22%	4	0	0	0	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0511	0.1022	0.0613
Skill Transformation	Skill Ugradation	4.64%	9.02%	5	0	0	0	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0418	0.0464
	Skill Development	4.38%		4	0	0	0	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0175	0.0438	0.0131
																	0.0138	0.0307	0.0376	0.0380	0.0201
																	0.0223	0.0342	0.0378	0.0291	0.1233
																	A12	A23	A34	A45	AT
																	0.262079246				
																	2.125869996				
																	WCI				

Annexure XVII- Bank of Baroda bank WCI Estimation

Assessment Factor	Assessment variables	(Relative weights)(wr)	Cumulative Weights	score	Unity Matrix					AF=I * RF	AF matrix					MD= wr *	Membership Degree Matrix (MD)				
					1	2	**3**	4	5		1	2	**3**	2	5		**1**	**2**	**3**	**2**	**5**
Future Prospects Analysis	**Prospects Assessment**	**13.50%**	**13.50%**	2	0	1	**0**	0	0		0.8	1	0.5	0.2	0		0.1080	0.1350	0.0675	0.0270	0.0000
Training Exposure	**Training Effectiveness**	**3.32%**	**9.79%**	5	0	0	**0**	0	1		0	0	0.2	0.4	1		0.0000	0.0000	0.0066	0.0133	0.0332
	Training needs	**3.18%**		4	0	0	**0**	1	0		0	0	0.6	1	0.4		0.0000	0.0000	0.0191	0.0318	0.0127
	Training support	**3.29%**		3	0	0	**1**	0	0		0	0.5	1	0.5	0		0.0000	0.0165	0.0329	0.0165	0.0000
Work management	**Work efficiency**	**3.74%**	**7.62%**	3	0	0	**1**	0	0		0	0.3	1	0.7	0		0.0000	0.0112	0.0374	0.0262	0.0000
	Work-life balance	**3.89%**		4	0	0	**0**	1	0		0	0	0.9	1	0.1		0.0000	0.0000	0.0350	0.0389	0.0039
Employee Adaptability to change	**Adequacy**	**4.57%**	**10.53%**	5	0	0	**0**	0	1		0	0	0	0.6	1		0.0000	0.0000	0.0000	0.0274	0.0457
	preparedness	**5.96%**		4	0	0	**0**	1	0		0	0.2	0.5	1	0		0.0000	0.0119	0.0298	0.0596	0.0000
Compensation Management	**Structured Approach for recruitment planning**	**10.02%**	**10.02%**	5	0	0	**0**	0	1		0	0	0	0.4	1		0.0000	0.0000	0.0000	0.0401	0.1002
Competency	**Competency Building strategy**	**10.97%**	**10.97%**	3	0	0	**1**	0	0		0	0.6	1	0.7	0		0.0000	0.0658	0.1097	0.0768	0.0000
Career planning	**Career progression**	**6.54%**	**12.07%**	2	0	1	**0**	0	0		0.4	1	0.5	0	0		0.0262	0.0654	0.0327	0.0000	0.0000
	planning during Job Reduction	**5.52%**		4	0	0	**0**	1	0		0	0	0.6	1	0.5		0.0000	0.0000	0.0331	0.0552	0.0276
Performance Management	**Transparency**	**4.43%**	**8.69%**	2	0	1	**0**	0	0		0.6	1	0.5	0	0		0.0266	0.0443	0.0222	0.0000	0.0000
	KRA's	**4.26%**		3	0	0	**1**	0	0		0	0.8	1	0.6	0		0.0000	0.0341	0.0426	0.0256	0.0000
Skill Deficiency	**Skill Deficiency**	**7.50%**	**7.50%**	4	0	0	**0**	1	0		0	0	0.5	1	0.6		0.0000	0.0000	0.0375	0.0750	0.0450
Skill Transformation	**Skill Ugradation**	**4.60%**	**9.30%**	5	0	0	**0**	0	1		0	0	0	0.9	1		0.0000	0.0000	0.0000	0.0414	0.0460
	Skill Development	**4.70%**		4	0	0	**0**	1	0		0	0	0.4	1	0.3		0.0000	0.0000	0.0188	0.0470	0.0141
																	0.0175	0.0348	0.0372	0.0351	0.0187
																	0.0261	0.0360	0.0362	0.0269	0.1252
																	A12	A23	A34	A45	AT
																	0.260437124				
																	2.080				

Annexure XVIII: Task Completion Time Slots

Activity/Completion Time	SEPT,2017	OCT,2017	NOV,2017	DEC,2017	JAN,2018	FEB,2018	APR,2018
Technical Development & Evolution of Banking Business							
Technical Disruption and Indian Banking Business							
Challenges Pertain to technology Disruptions							
Workforce challenges Identification							
Workforce Challenges identification							
Statistical Validation							
Questionnaire Preparation							
Questionnaire validation							
Questionnaire Circulation							
Pilot study							
Data Collection							
Challenge Assessment using Fuzzy logic(pilot study)							
Fuzzy Logic Framework Building							
Challenge Assessment Final Study							
Workforce Challenge Index distribution across selected banks							
Exact Challenge quantification							
Assessment result Validation							
Mitigation framework Background							
Mitigation Model Building							
Report writing							