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Predictive Analytics Adoption by Banking and Financial Services The Future Perspective

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Abstract*: Predictive Analytics is not the magic key to solve all the business problems but if utilized properly by aligning the business objectives with this technology, it surely can help tackle one problem at a time and create robust solutions to some of their business problems. Banking and Financial Services have been targets of financial frauds and have been used as an instrument by financial fraudsters. Predictive Analytics is being used by banking and financial services sector to prevent such frauds, however the adoption is not at par with Information Technology, Healthcare and Pharmaceutical, and E-commerce [1] .This paper is for analyzing the critical factors that are causing Banking and Financial Services sector adoption to be slower than the other industries and suggest drivers to improve the adoption thus support it in fighting financial frauds through Predictive Analytics and safeguarding itself and its customers' interest. The paper will also discuss various areas of Predictive Analytics being used by Banking and Financial Services companies to detect financial frauds. This paper will help set the base for Banking and Financial Services institutions, who are still not fully utilizing the potential of Predictive Analytics, to understand its potential and as well as help them adopt Predictive Analytics.

***Index Terms*: Analytics based decisions, Predictive Analytics adoption drivers, Predictive Analytics adoption in Banking and Financial Services, Predictive Analytics in Business Decisions.**

I. INTRODUCTION

Banking and Financial Services are part of the larger Financial Sector and the definition of Financial Sector as per Investopedia is "The financial sector is a category of the economy made up of firms that provide financial services to commercial and retail customers. This sector includes banks, investment funds, insurance companies and real estate. Financial services perform best in low-interest-rate environments. A large portion of this sector generates revenue from mortgages and loans, which gain value as interest rates drop." [1]

The definition of Financial Services as per Investopedia is "Companies in the financial services industry are in the business of managing money. Globally, the financial services industry leads the world in terms of earnings and equity market capitalization. Large conglomerates dominate this sector, but it also includes a diverse range of smaller companies." [2] The financial services sector includes banks, insurance companies, mortgage or loan companies, investment services, mutual funds, private equity, wealth management, credit card companies and so on. Though the financial services include banking or banks, the banks provide financial products and services both, and thus are considered within financial services sector as well as separately. The major difference being the way these institutions earn revenue; banks earn revenue on the difference in the interest rates it gives to the depositor and the rate it charges the borrower, and financial services earn revenue through fees, commission and service charges on various financial services it provides such as wealth management, insurance, investment advisory etc. With the added advantage new technologies many companies started to provide banking and financial services in completely digital way, and these are called 'Fintech'. Fintech are different from traditional banking and financial institutions in the way they employ technology to their advantage. The definition of Fintech as per Investopedia is "Fintech is used to describe new tech that seeks to improve and automate the delivery and use of financial services. At its core, fintech is utilized to help companies, business owners and consumers better manage their financial operations, processes and lives by utilizing specialized software and algorithms that are used on computers and, increasingly, smartphones. Fintech, the word, is a combination of 'financial technology'" [3]

Similarly, TechFin are new set of technology companies that are entering in the banking and financial services sector using the advantage of their existing technology set and platform to provide these services. The difference between Fintech and TechFin as per Forbes is "The difference between fintech and techfin is based on the origin of the underlying organization. Fintech usually references an organization where financial services are delivered through a better experience using digital technologies to reduce costs, increase revenue and remove friction." [4]

II. NEED FOR PREDICTIVE ANALYTICS

When a company is dealing with finances and money, it is running the risk of being cheated by fraudsters, people who try different methods to steal money from the banks and financial services companies and get away without being caught. To prevent such fraudsters and scammers, banking and financial services employ securities at multiple levels i.e. cyber security, information security and physical security.

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[1] Based on a survey Predictive Analytics adoption in Information Technology, Healthcare and Pharmaceutical, and e-commerce are 12%, 11.3% and 9.8% respectively.

These security measures make used of different technologies such as Secure Socket Layer (SSL) for online transactions, encryption for data stored with the bank and for online transactions, multi-level/multi-factor access and authorization for access to online banking systems, AI (Artificial Intelligence) for improving fraud detection, device fingerprinting, malware detection, password tokens, transaction signing, endpoint protection, digital locking mechanisms, CCTV cameras and security guards [5] [6] [7]. These measures could be categorized into proactive and reactive security measures for example, encryption is proactive because it prevents the fraud from happening, the security guard is proactive because that stands as a deterrent as well as reactive because if the incident is taking place then it is reactive only, the other spectrum is reactive only such as CCTV because it does not prevent the incident as such but provides evidence to catch the culprits [8]. Predictive Analytics could be used as preventive measure to identify the incidents before they occur and sometimes it is so well in advance that Banking and Financial Services could take actions well before the fraud starts. There are many areas where banks and financial services providers may utilize predictive analytics to prevent frauds and thefts from happening and help in business growth. These are the following: Fraudulent action prediction: Based on the historical data from different financial institutions and scenarios where frauds have already happened, predictive analytics can be used to match the patterns in the current events taking place in real-time to identify if there could be a potential fraud. Appropriate actions could thus be taken to prevent the frauds from happening. Application screening: Scamsters apply for various products and services to fraud the banks or financial service providers. For example, they might take loan from the bank and never repay it. Predictive analytics can help in processing from the large volume of applications the potential applications that might lead to non-payment of loan or certain other frauds. Such applications might further be scrutinized or rejected altogether. Customer acquisitions and retention: Acquiring a new customer is always a costly affair for any company. It is always better and advisable to retain a loyal and worthy customer rather than acquiring a new one. Predictive Analytics can identify and recognize patterns if a loyal customer is planning to switch the bank or the service provider. This will help the bank to offer certain products or services matching customer needs or provide resolution to their problems and retain them. They may also utilize the predictions to identify potential high value customers and provide them with offers and services to acquire them.

Collections: Banks must timely and efficiently collect the money from customer who have taken loans from them. Any delays, non-payment or fraud might lead to huge loses. Predictive Analytics can help banks identify potential customer who might delay or not repay. Banks can help such customers with repayment options, defer the payment or provide discounts to encourage them to repay rather than default on the payments. Cash planning: How much cash is needed by a bank on a specific day is important to provide better customer service as well as comply with regulations related to providing customers cash from their bank accounts. A bank who might run short of cash when a customer demands it, may face legal and reputational problems. Predictive Analytics can help them plan their cash management better by identifying patterns when a normal looking day might become a cash crunch nightmare for the bank and thus arrange enough cash to satisfy all the customers' demands. Cross-selling: Customers want to receive product information only when it is relevant to their use otherwise the same information causes dissatisfaction and frustration in customer and they would opt out of marketing email or other channels used by financial services companies and banks. Predictive Analytics can help these institutions to identify customer product/services usage patterns and predict the best suited product/service that they might be interested in. Based on the feedback and usage of such information, the predictions can further be improved. [9], [10], [11]

III. OBJECTIVE

Objective of this paper is to study the adoption of predictive analytics by banks and financial service providers and the areas in which they are adopting the predictive analytics to their usage i.e. to improve their businesses and to provide better customer services. The objective was to study the data from the following perspectives:

1) Services used by the customers from banking and financial service businesses
2) Areas in which customers believe the banks are providing the services using predictive analytics
3) Services that customers believe could be provided by banking and financial services businesses using predictive analytics

IV. PROPOSED METHODOLOGY

To better understand the adoption of predictive analytics across banking and financial services, the study of services used by various customers was important. Similarly, the areas of importance from customer perspective was also important. Thus, the methodology as depicted in Fig. 1 was proposed:

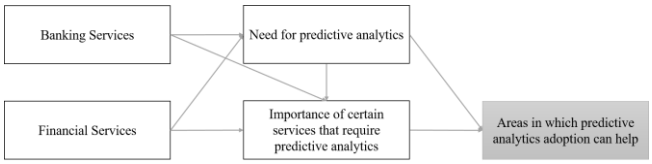

Fig. 1: Proposed Methodology

Based on this methodology, the following steps were taken:

1. Literature was reviewed to identify the types of services provided by banking and financial service providers
2. The services were identified which could be improved through the adoption of Predictive Analytics
3. Question was prepared to collect data about the following:

a. various banking services that the respondents use
b. various financial services that the respondents use
c. various areas that the respondents believe should use Predictive Analytics

d. the services which the respondents believe were important to get from their banking and financial service providers and could be achieved through the use of Predictive Analytics
4. A survey was designed to identify these areas.
5. The survey was shared across the globe through electronic mediums such as email, and messages using Gmail, LinkedIn, WhatsApp and Twitter.
6. Data was collected electronically using online survey.
7. The data was analyzed, and conclusions were drawn based on the data
The flowchart in Fig. 2 represents these steps taken to execute the research methodology.

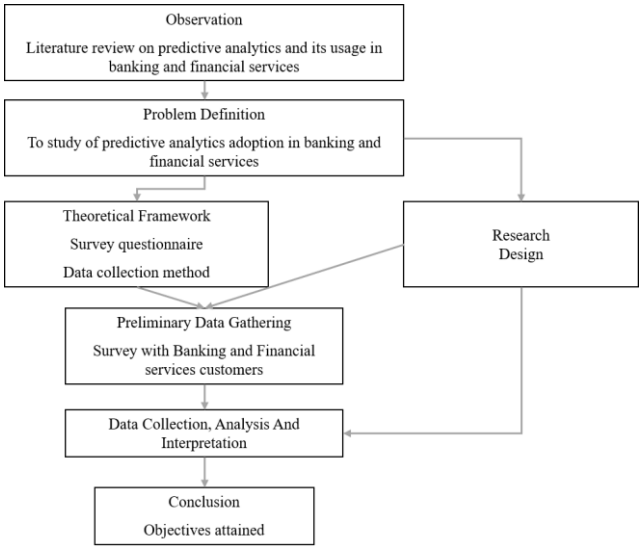

Fig. 2: Research Flowchart

The population selected for the survey was 500 out of which 59 responses were received in total. 50 responses were considered for the analysis based on correctness and completeness of the data received in the responses.

V. RESULT ANALYSIS

The data was analyzed, and following observations were made.

Table I: Responses based on country

Countries	Responses
IN	85.71%
US	9.82%
Unknown	1.79%
DE	0.89%
GB	0.89%
NZ	0.89%
Total	**100.00%**

The survey was shared globally, however, the banking scenario was chosen mostly aligned to India and thus 85% responses from India made sense for data analytics as shown in Table I. The data was collected from the banking and financial services consumers who are using one or more of the services provided. The distribution of services being used by the respondents is shown in Fig. 3.

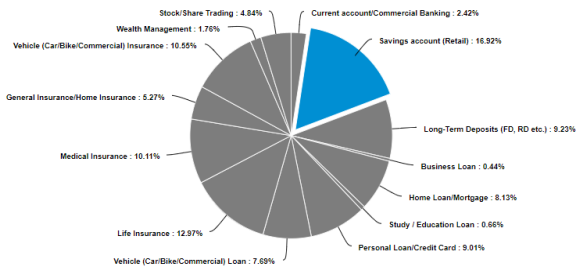

Fig. 3: Distribution of Banking and Financial services used by the customers

Based on the data in Table II it can be analyzed that the distribution of services between banking, insurance and other financial services is 53%, 40% and 7% respectively.

Table II: Banking and financial Services used by the customers

Answer	Count	Percent
Savings account (Retail)	54	15.65%
Life Insurance	43	12.46%
Medical Insurance	35	10.14%
Vehicle (Car/Bike/Commercial) Insurance	35	10.14%
Long-Term Deposits (FD, RD etc.)	33	9.57%
Personal Loan/Credit Card	32	9.28%
Home Loan/Mortgage	31	8.99%
Vehicle (Car/Bike/Commercial) Loan	25	7.25%
General Insurance/Home Insurance	20	5.80%
Stock/Share Trading	18	5.22%
Current account/Commercial Banking	8	2.32%
Wealth Management	6	1.74%
Study / Education Loan	3	0.87%
Business Loan	2	0.58%
Other	0	0.00%

Most of the consumers are using the services over electronic medium such as online, through mobile or over the phone. A limited 25% users are using the services in branch and even lesser number 3% are using the doorstep services (
Table III). This indicates that 54% users (online + mobile) are at the risk of online frauds, cyber theft, phishing and other cyber frauds; 18% consumers using services over the phone are under the risk of information breach, fake calls, identity theft and similar frauds.

Table III: Channel used for banking and financial services used by the customers

Answer	Count	Percent
Use services online / over internet	69	31.65%
Use services at a Branch	54	24.77%
Use service on mobile / Mobile app	49	22.48%
Use services over the Phone	40	18.35%
Use doorstep services	6	2.75%
Any Other (provide details)	0	0%

It is important to note that consumers are considering fraud detection as the main usage of predictive analytics by the banks, prediction of suspicious transaction detections and stopping money laundering is coming as second most important usage recommended for banks and financial service providers. These are closely followed by prediction of possible fraud based on usage pattern and prediction of possible online fraud and alerting the consumer. They have given adequate weightage to prediction of loan frauds and reducing NPA (Non-Performing Assets) as well (Table 4).
The least important aspect recommended for banks to utilize Predictive Analytics for is to recommend required products to the consumers, seconded by cash availability, followed by prediction of financial requirements and getting personalized services. These are the least important reasons for which consumers recommended banks and financial service providers to use predictive analytics (Table IV).

Table IV: Services from Banking and financial services as per their importance to the customers

Question	Score
Bank should predict possible banking frauds against them and safeguard customer interests	4.63
Bank should be able to predict suspicious transactions and stop money laundering	4.54
Should be able to predict a possible fraud in my account based on usage pattern and alert me	4.53
Banks/Financial services should be able to predict possible online fraud and alter me	4.44
Banks should be able to predict the possible loan defaults and reduce Non-Performing Assets (NPAs)	4.36
Banks should be able to approve loan/insurance request based on fraud preventive Predictive Analytics	4.15
Banks/Financial services should be able to do faster screening of applications using Predictive Analytics	4.08
Bank should predict expenses and alert me when my account balance is lower than that	4.07
Brokers should be able to predict future turmoil in stock markets and alert me with suitable options	4.07
Service provider should be able to predict when I am unhappy with them	4.02
Banks / Financial service should predict most comfortable channel and provide easy to use options	3.98
Insurance company should be able to predict medical expenses and offer insurance accordingly	3.88
Banks should predict lifetime value of customer and make efforts to retain High Value Customers	3.88
Wealth management provider must predict financial needs and give suitable investment options	3.86
Based on my interaction patterns banks/financial service should predict the services needed to avoid directing me to different departments	3.78
Insurance provide should predict my family's financial needs and recommend insurance amount accordingly	3.63
Banks and financial service provider should predict my usage behaviour and should provide personalized services	3.58
Bank should be able to predict potential financial requirements and send me related saving/investment schemes only	3.53
Banks/Insurance providers should predict cash availability with me and provide flexible EMIs or insurance premium payments	3.49
Banks / financial services should utilize my purchase pattern to recommend required products	3.37

Consumer perception regarding which bank is making best use of Predictive Analytics, the following data gives the insight. The options were for the Indian banks; however, option was available to provide details if the bank name is not available in the given list. There are 7 responses received which are not part of the given bank names list.
The top three banks which are perceived to use Predictive Analytics are HDFC Bank, ICICI Bank and Axis bank which also happen to be the most reputed Private banks in India. The next name is the Public Sector Bank State Bank of India, the largest government bank in India. SBI (State Bank of India) is the only government bank in the top 10 banks considered to be using Predictive Analytics for fraud prevention and in providing better services to the users (Table V).

Table V: Banking services institutions as per their usage by the customers

Answer	Count	Percent
HDFC Bank	31	14.55%
ICICI Bank	30	14.08%
Axis Bank	29	13.62%
State Bank of India (or other state banks)	13	6.10%
Kotak Mahindra Bank	12	5.63%
Standard Chartered Bank	11	5.16%
Yes Bank	11	5.16%
RBL Bank	9	4.23%
IDBI Bank	8	3.76%
IndusInd Bank	7	3.29%
Punjab National Bank	6	2.82%
Oriental Bank of Commerce	5	2.35%
Any Other Bank (provide details)	5	2.35%
Bank of Baroda	4	1.88%
Bank of India	4	1.88%
Canara Bank	4	1.88%
Central Bank of India	4	1.88%
IDFC Bank	4	1.88%
Corporation Bank	3	1.41%
Dena Bank	3	1.41%
Indian Bank	3	1.41%
Indian Overseas Bank	3	1.41%
Syndicate Bank	2	0.94%
Punjab and Sind Bank	1	0.47%
Union Bank of India	1	0.47%

As most of the responses (85%) were from India, the other responses and bank names are not considered (1-Bank of America, 1-Citibank, and 3-none of them). The respondents were also asked to select the insurance companies which are perceived to be using Predictive Analytics for various purposes.

The summary of responses is given in Table VI.

The data suggests that HDFC Standard Life, ICICI Lombard and ICICI Prudential Life Insurance are the top 3 insurance companies perceived to be using Predictive Analytics. The 2 state-owned insurance companies in the top 10 list are SBI Life and LIC of India (Table VI).

Table VI: Financial services institutions as per their usage by the customers

Answer	Count	Percent
HDFC Standard Life	24	12.44%
ICICI Lombard	24	12.44%
ICICI Prudential Life Insurance	21	10.88%
Bharti AXA	19	9.84%
Max Life Insurance	19	9.84%
TATA AIA Life Insurance	15	7.77%
Bajaj Allianz Life Insurance	14	7.25%
SBI Life	13	6.74%
Aviva Life Insurance	12	6.22%
LIC of India	12	6.22%
IFFCO TOKTO	8	4.15%
Any other insurance provider (provide details)	8	4.15%
United India Assurance	2	1.04%
New India Assurance	1	0.52%
Other government insurance provider	1	0.52%

In insurance companies list there are only 2 government providers. It could be concluded that adoption of Predictive Analytics is much slower in state-owned companies as compared to private entities.

And finally, with respect to the question of importance of using predictive analytics by banking and financial services companies, the customer believed that it is very important for these institutions to use it and they would want to recommend their financial service and insurance provider to use it, not only because it has become necessity rather than just a trend but also because it will help them provide better services, avoid frauds, and retain customers (Table VII)

Table VII: Importance of predictive analytics adoption as per customers

Question	Count	Score
Using predictive analytics by banks and financial services has become necessity rather than trendy	66	1.71
Banks and financial services will be able to provide better services, avoid frauds and perform better using predictive analytics	66	1.59
I recommend my bank and financial services to adopt Predictive Analytics for better customer services and retention	65	1.72

VI. CONCLUSION

It is evident that the adoption of Predictive Analytics has already started in the following areas i.e. credit scoring risk analysis, customer retention, operational decisions, investment decisions, operations optimization, and fraud prevention. We can say that the banking and financial service providers are steadily progressing towards adoption of Predictive Analytics in different areas and the success stories in one area are going to influence other areas as well as give confidence to the management to begin adoption of Predictive Analytics going forward.

The future for traditional banks and financial service providers is not that easy, not until they move faster than the new entrants such as Fintech and Techfin firms in their areas of expertise. Adoption of technology such as Predictive Analytics would give them this added advantage, however, this must not be overlooked that the fintech and Techfins of the world are always quite fast in adopting this technology and have been already using it to their advantage. The better adoption of similar technologies and practical solutions for their customers will surely be considered as the edge over competition in growing at a pace faster than their competition.

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