

Article

ANALYZING FINANCIAL LANDSCAPES: A COMPREHENSIVE STUDY OF BUSINESS ANALYTICS TOOLS IN FINANCIAL INSTITUTIONS AND SERVICES

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Abstract

The purpose of present research is to understand the application of various business analytic tools and techniques in financial institutions and services. The primary objective of this research is to understand and analyse market trends and operational efficiency of the financial landscape with the help of selected scripts and financial institutions. The study is based on secondary sources which include thorough literature review, journals, articles, and web sources. The study revealed that deposits and interest earned differ significantly between the years. Deposits, interest earned, gross NPAs & Net NPAs do not differ significantly between the banks. The study would be useful to investors, analysts, policymakers and regulatory bodies to upgrade the financial landscape.

Keywords: Business Analytics, Financial Landscape, Python, Financial sector

1. INTRODUCTION

The financial sector is the most crucial part of the Indian economy. Analysing the financial landscape includes studying features like banks, credit, insurance, and traders. Business analytics tools are useful to the financial sector. Business analytic tools are used to forecast big data in finance. financial data includes daily information like liabilities, assets, expenses, and revenue. These help them to manage market trends, investments, portfolio management, policies, and regulators. These tools are a combination of computer science and management studies. The financial institutions and services benefit by using business analytics tools. Business analytics is divided into four types descriptive, diagnostic, predictive, and prescriptive. Tools include Python, Power BI, Tableau, IBM SPSS, Excel, and SAS analytics. By analysing large data sets financial institutions can gain insights into customer segmentation, credit risk assessment, and fraud finding. The tools are mostly used to predict accurate data from large data sets. Machine learning (ML) algorithms like Natural processing languages are used to analyse unstructured data such as social media data and customer reviews and to extract information for sentiment analysis. Clustering techniques are used for customer segmentation to forecast sales trends and identify patterns.

2. LITERATURE REVIEW

Ibeh, C. et al (2024), study says that business analytics emerged as pivotal domains in enhancing strategic business decision-making process. Predictive analytics uses ML algorithms and statistical models to estimate future trends and outcomes. Isah, H., et al (2019), the study found that descriptive analytics is the first step in converting raw data into meaningful data. (Fishman & Stryker, 2020), says that descriptive analytics provides an understanding of data on what happened. These techniques like diagnostic, Predictive, and prescriptive analytics identify why it happened what will happen, and what to do. Buana Lintang Singarimum (2023), study found that banks use big data to customize their services based on customer segmentation, pricing techniques, and loyalty programs to build loyal customer relationships. These big data tools help to maintain customer info in 360-degree angles and advance techniques and methods to obtain escalating conflict of the buyers.

Sachin Kumar et al (2020), machine learning technology is used to understand customer behavior and preferences, services, and reduce cost. research also proved that analytics used in different activities such as fraud detection customer retention and market optimization. Sumit Maheshwari, et al (2021) study says that big data analytics such as predictive analytics, and ML can significantly help the decision-making process and operational efficiency. Ashraf Bany Mohammed, et al (2022), business intelligence (BI) and analytics influenced the banking sector in terms of data and technology infrastructure as well as availability management and human resource support with the implementation of BI and analytics in the banking sector. Shin-Chen Liang's (2023), concluded that fintech has gained more integration of technology in financial services including online payments, Robo-advice, and blockchain technology making fintech platforms secure, convenient, and fast online payment transactions by reducing traditional methods.

3. OBJECTIVES OF THE STUDY

To understand the application of business analytics in the financial landscape. To analyse and predict the historical price movements with the help of python and to investigate the efficiency of small finance banks by applying analytics.

4. METHODOLOGY

The present research is carried thorough literature review, journals, research articles and annual reports of corresponding banks. Two-Way ANOVA without replication and Python are used to test the efficiency of small finance banks and analyse the historical stock price data.

5. RESULTS AND FINDINGS

Table: 5.1: Financial indicators of small finance banks

Year	Financial Indicator	Au Small Finance Bank (ASB)	Ujjvan Small Finance Bank (USFB)	Suryoday Small Finance Bank (SSFb)	Equitas Small Finance Bank (ESFB)
2019	Deposits	19,422.44	7,379.44	1,593.43	9,006.74
2020		26,163.93	10,780.48	2,848.71	10,788.41
2021		35,979.31	13,135.77	3,255.68	16,391.97
2022		52,584.62	18,292.22	3,849.80	18,950.80
2023		69,364.99	25,537.68	5,166.72	25,380.56
2019	Total interest earned	2,949.13	1,831.61	530.11	2,111.93
2020		4,285.88	2,703.60	766.15	2,645.44
2021		4,950.05	2,806.07	776.15	3,194.41

2022		5,921.73	2,812.80	941.82	3,459.67
2023		8,205.41	4,164.99	1,183.68	4161,88
2019	Gross NPAs	470.14	97.85	49.62	295.71
2020		457.78	137.14	101.25	417.32
2021		1,502.83	1,070.60	393.68	642.78
2022		924.38	1,284.08	597.42	8,731.80
2023		981.31	630.61	191.40	7,239.60
2019		Net NPAs	294.50	27.55	12.01
2020	217.30		27.49	20.37	247.62
2021	755.46		424.58	188.12	266.17
2022	271.85		99.60	283.37	4,794.70
2023	286.16		9.04	92.97	312.01

Table: 5.2: Two- way ANOVA for deposits

Groups	Count	Sum	Average	Variance		
2019	4	37402.05	9350.5125	55206452.94		
2020	4	50581.53	12645.3825	95217375.59		
2021	4	68762.73	17190.6825	188092358.3		
2022	4	93677.44	23419.36	426611887.5		
2023	4	125449.95	31362.4875	733373423.4		
ASB	5	203515.29	40703.058	412310650.5		
USFB	5	75125.59	15025.118	50307723.74		
SSFB	5	16714.34	3342.868	1723935.841		
ESFB	5	80518.48	16103.696	43217089.62		
ANOVA						
SV	SS	DF	MS	F	P	F critical
Between years	1235665652	4	308916413	4.665401252	0.016716	3.259167
Between banks	3700932546	3	1233644182	18.63107582	8.24E-05	3.490295
Error	794571947	12	66214328.92			
Total	5731170145	19				

Inference:

The P-value is less than the alpha value 0.05. Hence, statistically significant. The P-value of 8.23522 is larger than the alpha, hence, not statistically significant.

Table: 5.3: Two-way ANOVA for Total Interest earned

Groups	Count	Sum	Average	Variance		
2019	4	7422.78	1855.695	1006337.385		
2020	4	10401.6	2600.4	2072016.903		
2021	4	11726.68	2931.67	2934977.321		
2022	4	13136.02	3284.005	4232105.365		
2023	4	17715.96	4428.99	8311476.255		
ASB	5	26312.2	5262.44	3874598.957		
USFB	5	14319.07	2863.814	697527.351		
SSFB	5	4198.44	839.688	58491.80627		
ESFB	5	15573.33	3114.666	611924.138		
ANOVA						
SV	SS	DF	MS	F	P	F critical
Between years	14377695.31	4	3594423.827	6.542777092	0.004936497	3.259167
Between banks	49078265.98	3	16359421.99	29.77836133	7.66528E-06	3.490295
Error	6592473.702	12	549372.8085			
Total	70048434.99	19				

Inference:

The P-value is 0.00493, is less than the alpha. Hence, results are statistically significant. The p-value is 7.665 is greater than alpha Hence, results are not statistically significant.

Table :5.4: Two -way ANOVA for Gross NPAs

	Count	Sum	Average	Variance		
2019	4	913.32	228.33	37324.81167		
2020	4	1113.49	278.3725	34270.81929		
2021	4	3609.89	902.4725	238335.3289		
2022	4	11537.68	2884.42	15275022.26		
2023	4	9042.92	2260.73	11121826.63		
ASB	5	4336.44	867.288	186399.3707		
USFB	5	3220.28	644.056	286764.0312		
SSFB	5	1333.37	266.674	51416.78858		
ESFB	5	17327.21	3465.442	17321116.16		
ANOVA						
SV	SS	DF	MS	F	P	F critical
Between years	23132104.32	4	5783026.079	1.438245251	0.280833	3.259167
Between banks	31869658.45	3	10623219.48	2.64200693	0.097042	3.490295
Error	48250681.08	12	4020890.09			
Total	103252443.9	19				

Inference:

The p-value is 0.280833 is greater than alpha hence, results are not significant. The p-value is 0.097042 which is greater than alpha hence, results are not significant.

Table: 5.5: Two-way ANOVA for Net NPAs

Groups	Count	Sum	Average	Variance		
2019	4	520.48	130.12	18220.35		
2020	4	512.78	128.195	14656.59		
2021	4	1634.33	408.5825	63154.98		
2022	4	5449.52	1362.38	5242984		
2023	4	700.18	175.045	21799.97		
ASB	5	1825.27	365.054	48534.3		
USFB	5	588.26	117.652	30643.7		
SSFB	5	596.84	119.368	13411.67		
ESFB	5	5806.92	1161.384	4127337		
ANOVA						
SV	SS	DF	MS	F	P	F critical
Between years	4460869	4	1115217	1.077605	0.410077	3.259167
Between banks	3663610	3	1221203	1.180017	0.358312	3.490295
Error	12418838	12	1034903			
Total	20543317	19				

Inference:

The p-value is 0.410077 is greater than the alpha value of 0.05, hence, results are not statistically significant. The p-value is 0.358312 which is greater than alpha value hence, net NPA does not differ significantly between banks.

Application of python

In this study, we have used Python to analyse the historical stock price data and calculate daily returns, weekly returns, monthly returns, and annual returns. In this, we are going to calculate ICICI Bank's historical stock price data set.

Table: 5.6: Source code for Daily returns

```
import numpy as np
import pandas as pd
data = pd.read_csv(r"C:\Users\SYED BASHA\Downloads\ICICIBANK.NS.csv")
data['Daily_Return'] = data['Close'].pct_change()
data = data.dropna()
print(data)
```

Table:5.7: Daily returns of ICICI bank stock price

	Date	Open	High	Low	Close \
1	2019-03-19	398.399994	400.950012	393.899994	398.399994
2	2019-03-20	397.600006	398.149994	392.200012	392.899994
3	2019-03-22	394.450012	396.299988	390.000000	391.799988
4	2019-03-25	387.950012	387.950012	382.500000	383.500000
5	2019-03-26	384.950012	395.500000	383.399994	394.100006
...
1230	2024-03-11	1087.949951	1087.949951	1076.750000	1078.699951
1231	2024-03-12	1077.050049	1094.800049	1055.650024	1076.849976
1232	2024-03-13	1077.150024	1089.650024	1073.150024	1083.949951
1233	2024-03-14	1080.000000	1097.099976	1075.050049	1083.599976
1234	2024-03-15	1072.000000	1086.250000	1070.000000	1080.349976

	Adj Close	Volume	Daily_Return
1	390.689026	11670392	0.000879
2	385.295471	14181408	-0.013805
3	384.216736	17409249	-0.002800
4	376.077423	12345034	-0.021184
5	386.472290	14063632	0.027640
...
1230	1078.699951	13310362	-0.008502
1231	1076.849976	21785435	-0.001715
1232	1083.949951	24855870	0.006593
1233	1083.599976	14231421	-0.000323
1234	1080.349976	66192734	-0.002999

[1234 rows x 8 columns]

Inference:

The analysis revealed the daily returns of ICICI bank stock price. The daily returns column represents the percentage change in stock price from the previous day’s closing price to the current day’s closing, price. The above analysis proved that the 2019-3-19 daily return was 0.09%, 2019-3-26 was 2.76%, and 2024-3-13 was 0.66%, Hence, during this period the ICICI stock price was under increasing trend. On 2019-3-20, 2019-3-22, 2019-3-25, 2024-3-11, 2024-3-12, 2024-3-14, and 2024-3-15 was recorded negative growth rates of -1.38%, -0.28%, -2.12%, -0.85%, -0.17%, -0.03% and -0.30 respectively. It can be concluded that investors should understand and analyze daily returns while investing in respective stocks.

Table: 5.8: Source code for weekly returns

```
import pandas as pd
data = pd.read_csv(r"C:\Users\SYED BASHA\Downloads\ICICIBANK.NS.csv")
data['Daily_Return'] = data['Close'].pct_change()
data = data.dropna()
data['Date'] = pd.to_datetime(data['Date'])
data.set_index('Date', inplace=True)
weekly_returns = data['Daily_Return'].resample('W').sum()
print("Weekly Returns:")
print(weekly_returns)
```

Table: 5.9: Weekly returns of ICICI bank stock price

Weekly Returns:

Date	
2019-03-24	-0.015726
2019-03-31	0.022865
2019-04-07	-0.025133
2019-04-14	0.010838
2019-04-21	0.025206
	...
2024-02-18	0.012767
2024-02-25	0.036778
2024-03-03	0.024510
2024-03-10	0.001055
2024-03-17	-0.006946

Freq: W-SUN, Name: Daily_Return, Length: 261, dtype: float64

Inference:

The analysis revealed the Weekly returns of ICICI bank stock price. The weekly returns column represents the percentage change in stock price from the previous week's closing price to the current week's closing, price. The stock recorded negative growth rates of -1.60, -2.50, and -0.07 during the period of study. The remaining week's returns represent a positive tendency; hence, it helps the analysts and investors to understand the weekly price movements before investing in the script.

Table: 5.10: Source code for monthly returns

```
import pandas as pd
data = pd.read_csv(r"C:\Users\SYED BASHA\Downloads\ICICIBANK.NS.csv")
data['Daily_Return'] = data['Close'].pct_change()
data = data.dropna()
data['Date'] = pd.to_datetime(data['Date'])
data.set_index('Date', inplace=True)
monthly_returns = data['Daily_Return'].resample('M').sum()
print("\nMonthly Returns:")
print(monthly_returns)
```

Table:5.11: Monthly returns of ICICI bank stock price

```

Monthly Returns:
Date
2019-03-31    0.007139
2019-04-30    0.019471
2019-05-31    0.044041
2019-06-30    0.032482
2019-07-31   -0.027487
...
2023-11-30    0.021834
2023-12-31    0.065903
2024-01-31    0.033084
2024-02-29    0.024734
2024-03-31    0.027088
Freq: M, Name: Daily_Return, Length: 61, dtype: float64

```

Inference:

The analysis revealed the Monthly returns of ICICI bank stock price. The monthly returns represent the percentage change in stock price from the previous month's closing price to the current month's closing price. The stock recorded a negative growth rate on 2019-07-31, during this month's stock price declined to -2.75%. The remaining monthly returns represent a positive tendency; hence, it helps the analysts and investors to understand the weekly price movements before investing in the script.

Table: 5.12: Source code for Annual returns

```

import pandas as pd
data = pd.read_csv(r"C:\Users\SYED BASHA\Downloads\ICICIBANK.NS.csv")
data['Daily_Return'] = data['Close'].pct_change()
data = data.dropna()
data['Date'] = pd.to_datetime(data['Date'])
data.set_index('Date', inplace=True)
annual_returns = data['Daily_Return'].resample('Y').sum()
print("\nAnnual Returns:")
print(annual_returns)

```

Table:5.13: Annual returns of ICICI bank stock price

```

Annual Returns:
Date
2019-12-31    0.334848
2020-12-31    0.136169
2021-12-31    0.371243
2022-12-31    0.211648
2023-12-31    0.123932
2024-12-31    0.084906
Freq: A-DEC, Name: Daily_Return, dtype: float64

```

Inference:

The analysis revealed the Annual returns of ICICI bank stock price. The Annual returns represent the percentage change in stock price from the previous year's closing price to the current year's closing, price. During the period of study, the recorded annual growth as of 2019-3-21 annual return on stock price was 33.48%, on 2020-12-31, the annual return decreased by -13.69%, on 2021-12-31 the annual return had sustainable growth of 37.12%, on 2022-12-31 the annual returns increased by 21.16% during this period. On 2023-12-31 the annual returns moderate growth 12.39% during period. In 2024 March the price continued to rise by 8.49%. hence, it helps the analysts and investors understand the annual price movements before investing in the script.

6. FINDINGS OF THE STUDY

It is evident that business analytics tools can reduce the complexity of large data, predict accurate patterns, and be useful to policymakers to make accurate business decisions. It was found that business analytics tools such as Python and Excel were applied, and Python was used to analyse the daily, weekly, monthly, and annual returns of ICICI Bank. Excel was applied to analyse the operational efficiency of selected small finance banks for five years. The analysis revealed that the average daily returns of ICICI Bank were 1.4 %, it has been analysed with the help of business analytics tools i.e. python. Hence, investors can easily construct their optimal portfolio. The analysis found that the Weekly returns of ICICI bank stock price. The stock recorded negative growth rates of -1.60%, -2.50, and -0.07 during the period of study. The remaining week's returns represent a positive tendency; Hence, it helps the analysts and investors understand the weekly price movements before investing in the script. It is evident that ICICI recorded negative returns of -2.75% in July 2019. In the remaining months, the stock has recorded positive returns. Hence, the average monthly returns of the script were 2.46%. It is found that during the period of study, the average annual return of ICICI banks was 16.51%, Hence, the long-term investors can consider this option for minimizing their risk. The analysis of Variance proved that there is a significant difference between years in terms of deposits and interest earned. It was found that deposits, interest earned, gross NPAs, and net NPAs do not differ significantly between the banks. The two-ANOVA concluded that gross non-performing assets and net non-performing assets do not differ significantly between years.

7. RECOMMENDATIONS OF THE STUDY

The present study recommends utilizing business analytics in financial institutions and services effective control and analysis of large data sets and predicting accurate patterns. Encouraging investors and financial analysts to leverage business analytics tools such as Python and Excel for analysing stock performance and portfolio construction. Investors can consider ICICI Bank's stock for long-term investment due to consistently positive returns of 16.51%. Gross NPA and Net NPA do not differ significantly between years and banks. Hence, banks should implement effective strategies. Business analytics tools like machine learning are used to understand customer preferences, services, and market trends. Artificial intelligence is used by the finance sector to analyse credit card history and fraud detection to protect customers. Financial institutions and services are increasing the usage of data analytics to gain insights and improve decision-making to provide better customer segmentation. Developing and implementing robust risk method strategies in the banking sector, for factors like NPAs and market volatility. It is advised that advanced predictive

modelling tools and techniques in financial institutions can develop predictive models to forecast potential NPAs and identify high-risk loans. Python and Excel can be used for better data visualization purposes which helps investors to find accurate details.

CONCLUSION

This study highlights the usage of business analytics tools in the financial landscape, particularly in understanding market trends and operational efficiency. These findings help to understand the potential of these tools in predicting accurate data patterns and assisting policymakers and regulators in making informed decisions. Through the analysis of selected financial institutions and services, leveraging analytics can enhance strategic decision-making and contribute to strengthening the financial sector.

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