

An Analysis of the Impacts of Covid-19 on the Sustainability of the Banking Sector of Pakistan: A Cael's Approach

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Abstract:- This study aims to examine how COVID-19 has affected the sustainability of Pakistan's banking industry. It is carried out to assess the banking industry's sustainable indicators in CAELS approach which explain Capital adequacy, Asset quality, liquidity Earnings (Profitability) and sensitivity to market risk. The study was conducted using a quantitative approach to determine the pandemic's impact. The data for covid percentage was taken from the World Health Organization's website and data for sustainable indicators have been taken from the State Bank of Pakistan's financial statement analysis of the financial sector from 2017 to 2021. The sample size of selected banks are 10 banks such as Askari Bank LTD, Allied Bank LTD, Bank Al-falah LTD, Habib Bank LTD, National Bank of Pakistan, Faysal Bank LTD, United Bank LTD, MCB Ban LTD, JS bank LTD, and SILK bank LTD. The research reveals a significant relationship between Profitability in terms of non-markup/ interest expense to total income which indicates a positive relationship with covid 19. The correlation of liquidity in terms of investment to total assets indicated a positively significant relationship with Covid-19. Finally, the Capital adequacy ratio in terms of Commitments & contingencies to total equity indicated a negatively significant relationship with covid-19. Besides all other selected variables are non-significant and have no effect from Covid-19.

Keywords:- Covid-19, Banking Sector, CAEL's Rating System, Sustainability, Pandemic.

I. INTRODUCTION

In 2019, patient zero of Covid-19 was detected in China. By 20 May 2020, It has spread around the world, infecting 4,806,299 individuals and killing 318,599 people. SARS-CoV-2 (severe acute respiratory syndrome coronavirus) is a kind of severe pneumonia (Marco Ciotti et. Al, 2020).

The World Health Organization (WHO) declared Covid-19 as an emergency health crisis on January 30, 2020. Then, at that point, WHO heightens this status to a worldwide pandemic on March 11, 2020. The quantity of the number of Covid cases keeps on expanding worldwide. WHO has announced that as of 31st March 2020, more than 190 nations have affirmed getting COVID-19 cases. The quantity of Covid cases overall

has arrived at 781,485 cases. From this number, there were 164,726 recuperated patients. In the meantime, 37,578 individuals passed on (WHO, 2020)

On 26 February 2020, the first case of COVID-19 was detected in Karachi one of the popular cities in Pakistan (Abdul Bari Malik, 2020). Cases of Covid-19 were exponentially increased by then. Patient zero had a history of traveling from Iran. To prevent the spread of COVID-19, the government of Pakistan closed all educational institutions and imposed a lockdown.

The banking industry was growing at an unexpectedly greater rate before COVID-19. However, the pandemic started upsetting the way banks were performing worldwide (Mersha & Worku, 2020). The covid-19 has impacted hard on human being life and financial markets all around the world. It impacted the global economy and businesses as well (Summary, 2020). In addition, many sectors like tourism and travel, transportation, oil and gas, trade, and construction have also been affected by COVID-19 (Anwar et al., 2020).

The ongoing concentration additionally models the unpredictability of banking stock costs. Not exclusively are the chosen occasions state-of-the-art, but the ongoing information (in the continuous pandemic) likewise adds to the oddity of this review. The discoveries could offer solutions to current strategy needs. Although studies on political design have been published, their focus has been limited to changes in government. This study is unique in that it explores the implications of COVID-19 and other political and economic events on Pakistan's banking industry. (Jalil, 2020).

The CAEL'S model is one of the necessary models to evaluate and examine this type of disruption in Pakistan's banking sector (Amin, 2020).

Numerous banks don't know about assessing their calling reports and how to survey their evaluations yet there is an incredible need to figure out, crafted by the Firms and how to deal with the situation whenever there is a difficult time to manage the finances. It is vital to evaluate the adequacy of monetary establishments through a rating framework which is utilized by government and state controllers, typically known as the CAELS framework. "This approach was developed by the approach named CAMELS in the 1980s by ACCION (Americans for Community Cooperation in Other Nations) to

assist North American controller banks (Milligan, 2002, p. 70). CAELS is a process used by State bank of Pakistan controllers to determine the monetary and administrative stability of commercial lending foundations. On the CAELS framework, data from many sources such as fiscal summaries, money sources, macroeconomic statistics, financial plan and income prediction, personnel, and company activities are expected. This model assesses the bank's overall condition, assets, and deficiencies. (Sarker, 2005, p. 6)".

The CAELS Approach is further explained in next Chapter.

A. Problem Statement

The purpose of this research is to analyze the influence of the COVID-19 pandemic on sustainable indicators of Pakistan's banking sector. Related researchers such as Putri et al (2022) worked on Capital Adequacy Ratio (CAR), Sensitivity of market and Earning and Gazi et al (2022) worked on Asset Quality suggested covering all sustainable indicators of the banking sector. Looking into the suggestions, this study is focused on sustainable indicators, well known as CAELS framework in the Pakistan banking sector.

B. Research Question and Objectives

What is the impact of COVID-19 on sustainability of banking sector of Pakistan?

a) Objectives

- To assess the impact of COVID-19 on capital adequacy ratio of the banking sector of Pakistan
- To examine the impact of COVID-19 on the asset quality of the banking sector of Pakistan
- To analyze the impact of COVID-19 on the Earning of the banking sectors of Pakistan
- To evaluate the impact of COVID-19 on the Liquidity of the banking sector of Pakistan
- To explore the impacts of COVID-19 on the sensitivity to market risk of the banking sector of Pakistan

II. CAELS' APPROACH

1) Capital Adequacy Ratio

Capital adequacy addresses the connection among value and risk-weighted resources, how to rise value and measures the capacity to which the association notices advance misfortunes (Ghouse, 2021).

The capital adequacy ratio demonstrates a bank's compliance with base capital guidelines while saving a sum. The capital construction focus for any bank is extremely important, as research has revealed that the number of large institutional investors in banks has a positive effect on productivity rather than risk (Zeb, 2017). Several researchers have focused on bank capital proportions (for example, "Capital Adequacy Ratio") and discovered an important and positive relationship/impact of capital on benefit intermediaries and significant key monetary execution pointers. The vehicle has a clear impact on credit adjustment and a favourable loan outcome. It investigated the relationship between Capital Adequacy Ratio proportions and proficiency and discovered that the effectiveness proportion has a significant impact on

Capital Adequacy Ratio in Islamic banks and a negative impact on Capital Adequacy Ratio in conventional banks. The pandemic has had a negative impact on the key factors that banks rely on, such as resource quality, expansion, cost control, and liquidity. This has resulted in a major breakdown in Pakistan's banking sector from 2019 to 2021. (Jalil, 2020) Binh Dao 2021, identifies the significant relationship between the Capital adequacy ratio and banks' performance. The paper uses 128 observations of 16 Vietnamese commercial banks during the period from 2010 to 2017.

Alika Blessing 2021 finds the impact of covid-19 on the Capital adequacy ratio and banks' performance in Nigeria. Banks' performance was measured by Return on Assets (ROA) and a number of COVID-positive cases were taken as an indicator of the virus. The finding shows the positive and significant impact of Capital adequacy on Nigerian Banks.

Factors Affecting Non-performing Loans in Pakistan during the Covid-19 Pandemic: A Case of Micro Finance Banks Conducts a study about the factor affecting nonperforming loans in the covid situation. Researchers used MANOVA to evaluate the results. The variables taken for this research were GDP growth rate, management efficiency, bank size and return on assets. The findings show all variables have a significant effect except bank size on non-performing loans. Moreover, the non-performing loan also has a positive relationship with the country's economy.

According to Awais et. al (2022), the post-performance of the banking sector of Pakistan has been good. They are able to absorb the shock of COVID-19 and be able to make efficient monetary policies that help them with NPLs. Moreover, banks in Pakistan were also able to support small businesses in the event of covid-19.

According to Arafat et. al (2021), Islamic and conventional, both types of banks were affected by COVID-19 in terms of profitability. In terms of stability, the authors did not find significant evidence for impacts on the banks.

In the research, Bhutto et. al (2022), investigates the stock prices of IB and CB. The finding shows there is a negative relationship between covid-19 and stock prices taking the first wave of covid-19 into consideration. However, the second wave shows a positive relationship between covid and stock prices. CB are more affected by this crisis than IB. In addition, the results also show the most affected, by the covid, are conventional banks, and oil and gas exploration and marketing companies.

Bipasha et. Al 2021, examines the Bangladesh bank in the situation of COVID-19. Already, the non-performing loans (NPL) of banks in Bangladesh is 10%, and the pandemic has worsened the situation. Using the state-designed stress testing model on banks' firm value, capital adequacy, and interest income, the results show if the further shock in NPL of 10% is increased the bank's CAR will go to a minimum as per BASEL-III requirements. Furthermore, a shock to 13% will bring CAR to zero or negative value. The papers suggest, the government of Bangladesh should take immediate and innovative policy measures to prevent a large-scale and contagious banking crisis in Bangladesh. The paper offers lessons for other developing and emerging economies similar to Bangladesh.

Ulumuddin Nurul Fakhri, and Angga Darmawan differentiate between Islamic and conventional banking. The result shows that Islamic banking is more vulnerable than conventional banking in COVID-19.

2) *Asset Quality*

Asset quality, the nature of a portfolio, evaluates the portfolio risk and shows the efficiency of long-haul resources.

Many experts examined the significance of 'A' "Asset/Loan Quality in Banks" because advances are the foundation of banks' resources. In banks, resource quality is important because the value of resources can depreciate quickly if they are exposed to high risk. Resource/Loan quality refers to how banks manage their resources and credits in order to maximize the pay of these resources while limiting non-performing advances and non-performing resources. Scientists discovered that poor resource quality and high non-performing advances have a negative impact on benefit proportions and other KPIs (Adil, 2020).

Furthermore, the effects of non-performing assets on the monetary stability and benefits of public banks are investigated. The review concluded that non-performing advances have an impact on the financial positions of banking and non-banking financial organizations. The funding decisions for item improvement activities under customary introductory coin contributions and conventional bank advances in the square chain time assumed that supporting models have a significant impact on ideal evaluation, starting benefits, and quality choices. The epidemic reduces asset and loan quality in the banking sector; certain decisions have been made, but the virus's situation varies over time, resulting in total damage to banks' assets (Ali et al, 2020).

To improve the resource quality of banks, it was discovered that quarterly monetary reports of banks help to develop credit and resource quality. Keeping money with lower resource quality will benefit more from pay increases (for example, non-interest pay) and will expand the benefit. Banks should expand non-performing credit arrangements, and banks should build solid and proactive units to effectively manage non-performing advances as they transition to performing advances. Non-performing loans raise the possibility of bank pain; thus, constructing an adequate number of arrangements can be a good activity to mitigate this misery risk. Finally, discoveries revealed that the traditional banking sector in Pakistan has superior resources when compared to the Islamic banking sector Amila Žunić et. Al 2021, finds the impact of Covid-19 on Asset Quality in banks of Bosnia and Herzegovina. Non-performing loans, GDP, loan loss provision, and dummy variable COVID-19 are the variables that taken in this paper. The results show all three variables were influenced by certain COVID-19. Furthermore, results show COVID-19 has a delayed effect on NPL.

Muhammad Akbar Ali Ansari et. Al 2021 Investigates the variables affecting NPL of microfinance banks during COVID-19. The variables taken are GDP growth rate, management efficiency, bank size, and return on assets. The result shows there is a significant positive relationship between NPL and the national economy.

Gazi et. Al (2022) analyze the performance and profitability of the Bangladeshi banking sector during COVID-19. Their findings show the banks which performed better, pre-covid, performed good post-covid in the terms of performance. In case of profitability high non-performing loan rates, holding more liquid assets, a high amount of hedging capital, and inappropriate bank size lessened the banks' profitability..

3) *Earning*

Measures the presentation of the establishment to increment and keep up with the absolute worth through income from activities. It additionally surveys the loan fee strategy, the board analyzes and changes the loan fee on miniature money advances and assesses the changed profit from resources and how well the resources are used (Sarker, 2005, p. 7).

MUSA et. al 2022 conducted a study on earning quality of banks in Saudi Arabia. They took national banks of Saudi Arabia as a sample to conduct research. According to the central bank of Saudi Arabia, there are 12 national banks in the country. The researcher took 8 out of 12 banks as a sample. The finding shows COVID-19 has significantly impacted negatively on banks earning. Moreover, the study shows the profits of commercial banks in Saudi Arabia decreased by 23.1%. Mirzaei et. al (2022) evaluates the stock performance of Islamic and Conventional banks. Researchers collected data from 426 banks in 48 different countries. The finding shows that Islamic banks has 10-13% higher earnings than conventional banks.

Siska et. Al (2021) analyze the situation of Indonesian banks during COVID-19. Its result shows the differences in profitability, efficiency, liquidity and credit risk of conventional banks before and after COVID-19. However, the solvency was not significantly different.

The study of Sohibien et. Al (2022) shows the relationship of ROA and Financing in the period of Covid-19. The results shows positive and significant relation between ROA and Financing, when means whenever Roa increases, financing also increases and vice versa.

4) *Liquidity*

Liquidity Management examines foundation liabilities like financing cost, installment terms, tenor and so on. It likewise assesses store accessibility to satisfy its credit need and income necessities (Sarker, 2005, p. 8)

Siska et al. (2021) assess the COVID-19 scenario for Indonesian banks. The study's findings highlight the variations between traditional banks' income, productivity, cash flow, and creditworthiness before and after COVID-19. However, the solvency was not significantly different.

In the early stages of COVID-19, banks encountered the highest worldwide liquidity demand ever seen. In preparation for the cash flow and financial interruptions brought on by the COVID-19 crisis, businesses significantly increased their cash withdrawals from their current credit lines. The biggest banks, which cater to the biggest businesses, were particularly focused on meeting increased liquidity demands. The pre-crisis financial environment had little impact on the big banks' ability to provide liquidity. Banks' ability to satisfy these liquidity demands is explained by coincidental cash inflows from the

Federal Reserve's liquidity injection programmes as well as deposits and significant pre-shock bank capital.

The second last composite is liquidity. The liquidity of the banking sector is an essential idea as the absence of liquefied investment can prompt a bank run. Moderate expansions in banking's liquidity help in improving their proficiency, while an excess of liquidity could expand the failure level of the bank. Liquidity and dissolvability risk factors decidedly influence cost-effectiveness measures. Islamic banks' liquidness is emphatically impacted via Capital Adequacy Ratio proportions while adversely impacted by credit chance and benefit proportions. In any case, it broke down the financial construction of moral and ordinary banking, and they observed that moral banking is developing more with more noteworthy liquidness and dissolvability levels but practically a similar productivity (Pham, 2020).

5) Sensitivity to Market Risk

Awareness to evaluate the gamble of the market is principally founded on unfriendly changes in item cost, loan fee, unfamiliar swapping scale, fixed resources, and the capacity of the board to distinguish and control these dangers (Adil, 2020)

This is the last aspect of the CAMELS approach; this point is the most important because this measure the level of sensitivity in the market related to the bank's operations. In this hard time, this type of evaluation of the banking sector will highlight the performance of the banks whether they are working well or not. However, this aspect has provided a wide range of information about the upcoming risks that the banking sector may have to face due to inflation and other governmental policies which are not as beneficial for the banks.

The existing literature of Pakistani banking sector is not based on all the elements of CAELS' Framework. The mostly area researched is on profitability of baking sector. Moreover, other research haven't taken COVID-19 as an independent variable. Till some extend, similar work is done by Gazi et. al 2022, where researcher has taken banking sector financial performance and Covid-19 as variables. The result shows the banks has shown overall good performance in an event of COVID-19.)

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III. METHODOLOGY

A. Overview

This section entails all the necessary materials, methods, and techniques used to carry out this research work. It presents a comprehensive description of the research design, domain of study, supporting literature sources, inclusion and exclusion criteria, data collection, sampling, and methods The researcher will gather information from the SBP and WHO websites.

B. Source of Literature

For completion of this study, a thorough literature study is conducted. The problem formulation is done by surveying various news articles, journal articles and conference papers, many of which are either ISI or Scopus indexed. Furthermore, grey literature is also used for problem analysis.

C. SEARCH INCLUSION AND EXCLUSION CRITERIA

Initially, at the stage of problem formulation, related researched papers, articles, and thesis are studied. Because COVID-19 is a recent virus that caused a pandemic, therefore, some of the grey literature is also considered for analyzing the havoc and implications caused by the virus. However, there are some exceptions regarding pioneer papers of some related concepts which are thoroughly studied and cited wherever needed. The detailed inclusion and exclusion criteria of articles studied for this research work are given as follows:

1) Inclusion Criteria

1. It must be clear from the title or abstract that the article lies in the study domain.
2. The articles are explicitly related to covid-19, bank performance, stock values and bank's sustainable indicators.
3. The articles are mostly written in the English language
4. The articles must be published within the timeframe of 2012 to 2022.

2) Exclusion Criteria

1. The articles that are written in any other language than English, Malay and Indonesian.
2. The articles that are not from ISI or Scopus-indexed journals, conferences, book chapters, and so on.
3. The articles that are not related to Banks or COVID-19.

D. RESEARCH DESIGN

The research design of this work is elaborated in terms of four important considerations, i.e., the strategy, the conceptual framework, data and target audience identification and tools and procedures of data analysis. Each of these four considerations is elaborated in this section.

E. Research Strategy

Quantitative Strategy is used for this research as the data available for this research is in numerical form.

F. Research Design

There is quantifiable data available. Excel sheets will be used to export data. After the data is gathered in an excel sheet, it will be exported to SPSS software, where it will be analysed using the multi-variant regression MANOVA approach.

G. Conceptual Framework

The conceptual framework designed for this research work is depicted in Fig 1. The given figure shows the dependent and independent variables for this research.

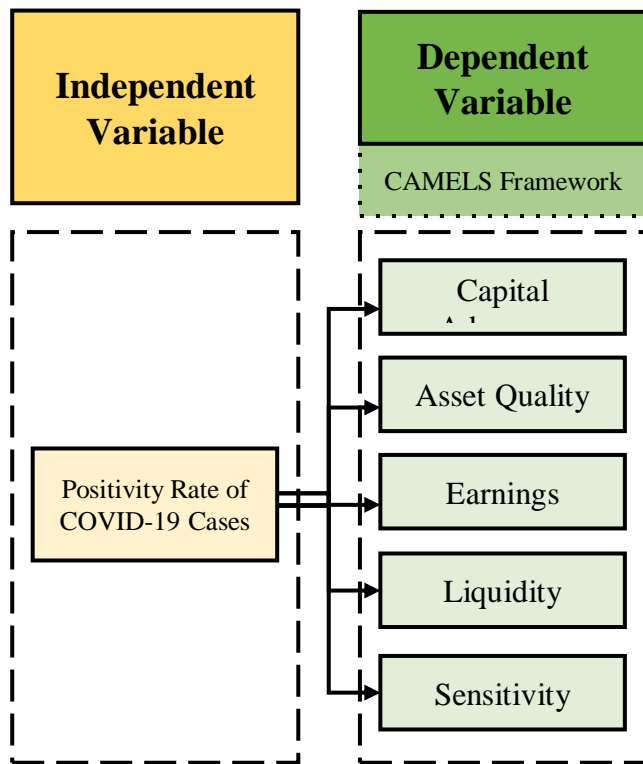


Fig 1 Conceptual Framework

H. Data Identification

Data collected for this research is secondary data, in numerical percentage form. It describes the rise and fall of bank sustainability indicators as well as the Covid-19 positivity rate. The data for Capital Adequacy Ratio, Asset Quality, Earning, Liquidity and Sensitivity to market risk are extracted from the State bank of Pakistan's FSA (Financial Stability Assessment) report and the data for COVID-19 positivity rate is taken from WHO website.

I. Tools for Data Analysis

The tools used for data analysis is multi-variant regression MANOVA in SPSS.

J. RESEARCH METHODS

The fundamental aim of this research work is to analyze the financial performance of banks in Pakistan using the CAMELS model under the impact of COVID-19. In this research, the banks' ratings are completed using six key parameters: capital adequacy, asset quality, management efficiency, earnings ability, liquidity, and sensitivity to market risks. Each of the six parameters of performance is rated on a scale of 1 to 5, varying from a fundamentally strong bank to a fundamentally weak bank. The research work in this thesis is qualitative research work. The fundamental points of analysis in this research work include:

- The extent COVID-19 crisis impacts the banks of Pakistan concerning capital adequacy.
- The extent COVID-19 crisis impacts the banks of Pakistan concerning asset quality.
- The extent COVID-19 crisis impacts the banks of Pakistan concerning earnings.
- The extent COVID-19 crisis impacts the banks of Pakistan concerning liquidity.

- The extent COVID-19 crisis impacts the banks of Pakistan concerning sensitivity.

K. Data Collection & Description

Population

According to the above define topics the population of the study is all banks of Pakistan.

Sample Size

The research analysis will be conducted by using a sample of 10 banks in Pakistan.

L. The Flow of Research Work

The research in this thesis is carried out in four phases which are elaborated as follows:

1) Phase 1: Preliminary Study – Problem Identification and Gap Analysis

This phase involves conducting an initial literature review on potential practical challenges faced by banks during natural disasters. This phase also includes the weak areas of the banks which were affected by Covid-19. According to the literature review, the most vulnerable areas that were affected by the Pandemic were Non-performing loans, non-interest income and liquidity. Going through SBP financial stability assessment (FSA) shows a decrease in all sustainable indicators when the positivity ratio of the COVID-19 case was increasing. This identifies the problems faced by the banking sector. This area was very less researched in Pakistan.

Multiple outcomes are achieved from this phase. The most important ones are problem identification, the knowledge about the banks globally, what problems were faced by them, what policies were made to overcome those problems, and gap in Pakistan research work, a problem statement, research questions, and their corresponding research objectives.

2) Phase 2: Extensive Literature Review – Identification of Indicators Associated with Sustainability of Banks

This phase involves conducting a comprehensive literature review on sustainability indicators of banks and practical challenges. It involves identifying the core factors that determine if the performance of the banks is sustainable or not. The indicators identified in this phase include Capital Adequacy ratio, Asset Quality, Management, Equity, Liquidity, and Sensitivity to the market. These indicators are known as the CAELS rating system. These indicators are further used to analyze the data collected for this research to come to an answer to the research questions focused on this thesis.

3) Phase 3: Research Design and Data Collection

This is one of the most significant phases of this research. This phase corresponds to the core activities of the research. In this phase, a detailed research design and plan are established. It involves identifying the data collection methods, data analysis methods, and other essential requirements for the successful conducting and completion of this research. Besides detailed research design, the data from the target banks is also collected in this phase. Hence, a major outcome of this phase includes the identification of the

primary data used for the analysis. The data is downloaded from State bank of Pakistan’s FSI and World Health Organization report. The data collected is about banks sustainable indicator which are given by State bank of Pakistan, that are, Capital adequacy ratio, Asset Quality, Management, Equity, Liquidity and Sensitivity to market risk and the data collected for Covid-19 is positivity rate in percentage.

4) Phase 4: Data Analysis and Results

The fourth phase of this research work includes the analysis of the acquired data. As an outcome of this phase, results are presented. Fig. 2.

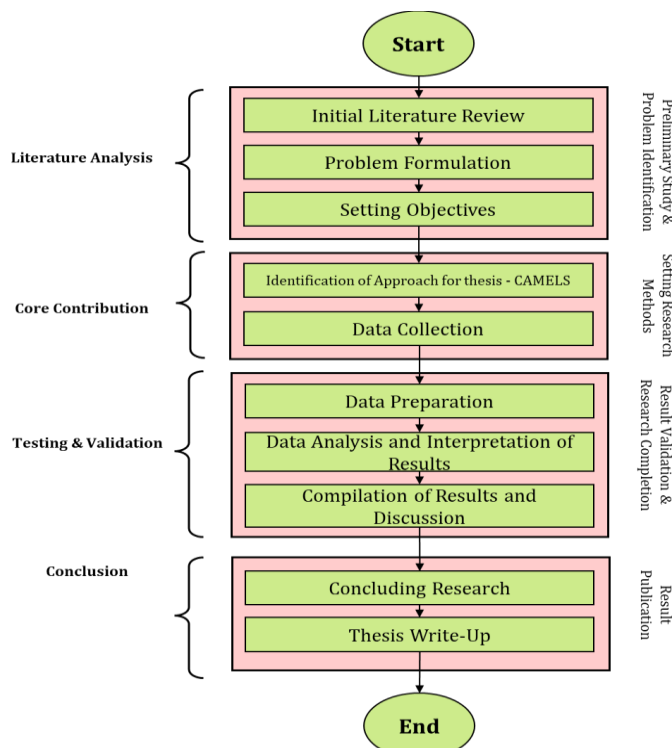


Fig 2 Research Phases

IV. RESULT AND DISCUSSION

A. Overview

In this section, various tests and their outcomes for this research work are described. According to Bartik et. al (2020), Meyer et. al (2022) and (Stephanie E.Changa, 2022) there are many businesses that has suffered losses due to the COVID-19 pandemic. The financial sector is one of those sectors that face a negative impact of COVID-19. Herein, the evaluation of covid-19 pandemic has been done on the sustainable indicators of the CAELS Framework. Applying, the MANOVA test to determine whether the variation across the group is the same or not.

B. Results And Discussion

1) Box Test

Box’s test serves as the foundation for Bartlett’s homogeneity of Covariance. Hence, to ascertain whether two or more co-variance matrices are equivalent or not. The assumption is that the absence of heteroskedasticity in the

model is a prerequisite for MANOVA. Consequently, the null hypothesis is observed that Co-variance matrices of the dependent variable are equal across groups. Hence the significant level must be greater than the required > 0.05 level.

TABLE I. BOX TEST OF EQUITY OF COVARIANCES

Box's Test of Equality of Covariance Matrices			
Box's M	153.507		
F	11.437		
df1	30		
df2	2061.525		
Sig.	0.063		
Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.			
a Design: Intercept + Positivity Rate			

Table I: Indicates the results of Box’s test for dependent variables such as Capital Adequacy Ratio, Asset Quality, Earning, Liquidity and Sensitivity to the Market risk and independent variable namely Covid Positivity rate, which is used to test the equivalent of covariance matrix the results of test 1 show the F value of 11.437 Sig. value is 0.063. which indicates the study has not violated the assumption of homogeneity of covariance and therefore can continue with the analysis because having a nonsignificant value or quired a greater than 0.05 significant level. Hence, the researcher met the assumption of homogeneity of covariance.

2) Leven’s Test of Equality of Error Variance

Levene’s test for variance equality determines whether the variances of two samples or groups are approximately equal or homogeneous. Hence, this test is another way to detect heteroskedasticity. The independent samples t-test assumes that the variances of the same groups are approximately identical or that the variances of the samples are homogeneous. As a result, variance homogeneity means that the variance in the group is of the same nature, or that two groups have the same type of variability. The variance does not have to be exactly equal; it only needs to be close. For equality of variance, we utilize a technique known as Levene’s test. Levene’s test determines if the variances of two groups of samples are about equal, hence it evaluates our assumptions of variance homogeneity just like any hypothesis test. The null hypothesis for the test is that the error variance of the dependent variable is the same throughout the dataset. Therefore, the *significance (sig.)* value of the dependent variables should be more than 0.05.

TABLE II. LEVENE’S TEST EQUALITY OF ERROR VARIANCES

Levene's Test of Equality of Error Variances^a

	F	df1	df2	Sig.
Capital Adequacy	2.578	2	47	.087
Asset Quality	.120	2	47	.888
Profitability	4.862	2	47	.012
Liquidity	.931	2	47	.401
Sensitivity to market risk	.214	2	47	.808

Table II: Contains all dependent variables such as Capital Adequacy Ratio, Asset Quality, Profitability, Liquidity and Sensitivity to market risk and the independent variable covid positivity rate. As mentioned above the null hypothesis exception is a prerequisite for this test to explain error variance of the dependent variable is the same throughout the dataset. Hence, the findings show all dependent variables are nonsignificant at different levels for dependent variables such as Sig. value of Capital adequacy (0.087), Asset quality (.888) Liquidity and Sensitivity to risk (.401 and .808).

Only Profitability indicated that researchers have violated the assumption of homogeneity of variance.

3) *Multivariate MANOVA Test*

MANOVA employs a multivariate test to examine the association between variables. Wilk's Lambda value represents the strength of the association in this test. This number falls between 0 and 1. The optimal value is about zero.

TABLE III. MULTIVARIATE TESTS
Multivariate Tests^a

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.998	5104.992 ^b	5.000	43.000	.000	.998
	Wilks' Lambda	.002	5104.992 ^b	5.000	43.000	.000	.998
	Hotelling's Trace	593.604	5104.992 ^b	5.000	43.000	.000	.998
	Roy's Largest Root	593.604	5104.992 ^b	5.000	43.000	.000	.998
PositivityRate	Pillai's Trace	.417	2.320	10.000	88.000	.018	.209
	Wilks' Lambda	.601	2.497 ^b	10.000	86.000	.011	.225
	Hotelling's Trace	.635	2.667	10.000	84.000	.007	.241
	Roy's Largest Root	.584	5.137 ^c	5.000	44.000	.001	.369

Table III: Indicates four different tests, and all show a significant relationship between variables for Pillai's Trace prob values is (.018), Wilks' Lambda is (.011) similarly (0.007) is for Hotelling's Trace and Roy's Largest Root test. Hence, data in which the most prominent test is Wilk's Lambda test, with a value is 0.011 which is close to 0. The significance value is very low i.e. 0.011 < 0.05. Thus, there is a significant relationship between the variables in this dataset.

4) *Test of between Subject Effect*

Table IV: If a p-value for one of the outcome variables is LESS THAN .05, then there was a significant main effect among the independent groups or levels of that outcome. If researchers find this significant main effect, they need to further run post hoc analyses to explain the effect.

Therefore, In this analysis, only one dependent variable find a less than 0.05 significant level hence further analysis would be confirmed from the Post hoc test.

TABLE IV. TEST OF BETWEEN-SUBJECT TESTS
Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Capital Adequacy	756.729 ^a	2	378.364	9.487	.000	.288
	Asset Quality	157.258 ^b	2	78.629	.174	.841	.007
	Liquidity	2392.833 ^c	2	1196.417	.871	.425	.036
	Liquidity	64.756 ^d	2	32.378	.627	.539	.026
	Sensitivity to market risk	105.741 ^e	2	52.871	.406	.669	.017
Intercept	Capital Adequacy	4409.442	1	4409.442	110.563	.000	.702
	Asset Quality	395169.243	1	395169.243	873.020	.000	.949
	Liquidity	203.865	1	203.865	.148	.702	.003
	Liquidity	313268.449	1	313268.449	6061.688	.000	.992
	Sensitivity to market risk	319248.560	1	319248.560	2452.097	.000	.981
PositivityRate	Capital Adequacy	756.729	2	378.364	9.487	.000	.288
	Asset Quality	157.258	2	78.629	.174	.841	.007
	Liquidity	2392.833	2	1196.417	.871	.425	.036
	Liquidity	64.756	2	32.378	.627	.539	.026
	Sensitivity to market risk	105.741	2	52.871	.406	.669	.017
Error	Capital Adequacy	1874.445	47	39.882			
	Asset Quality	21274.368	47	452.646			
	Liquidity	64654.276	47	1373.495			
	Liquidity	2428.963	47	51.680			
	Sensitivity to market risk	6119.124	47	130.194			
Total	Capital Adequacy	10444.174	50				
	Asset Quality	523998.914	50				
	Liquidity	68786.078	50				
	Liquidity	403042.020	50				
	Sensitivity to market risk	427287.650	50				
Corrected Total	Capital Adequacy	2631.174	49				
	Asset Quality	21431.627	49				
	Liquidity	66947.109	49				
	Liquidity	2493.719	49				
	Sensitivity to market risk	6224.865	49				

- a. R Squared = .288 (Adjusted R Squared = .257)
- b. R Squared = .007 (Adjusted R Squared = -.035)
- c. R Squared = .036 (Adjusted R Squared = -.005)
- d. R Squared = .026 (Adjusted R Squared = -.015)
- e. R Squared = .017 (Adjusted R Squared = -.025)

5) *POST HOC Test*

Table V: If a p-value is LESS THAN .05, then there was a significant difference between the independent groups or levels of the categorical predictor variable.

It indicates the mean difference between the two groups. Only is the Capital adequacy ratio difference is significant. The remaining variables have no significant difference between variables.

TABLE V. TABLE POST HOC TEST

Dependent Variable		Multiple Comparisons		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
		(I) Positivity Rate	(J) Positivity Rate				Lower Bound	Upper Bound
Capital Adequacy	Tukey HSD	.0000	.1564	-9.8020	2.30599	.000	-4.4012	15.5628
		.0000	.2915	3.5810	2.30599	.276	-1.9998	9.1618
		.0000	.1564	-9.8020	2.30599	.000	-15.5628	-4.4012
		.0000	.2915	-6.4010	2.82425	.071	-13.2360	.4340
		.0000	.2915	3.5810	2.30599	.276	-8.1618	1.9998
		.0000	.1564	6.4010	2.82425	.071	-4.340	13.2360
	LSD	.0000	.1564	9.8020	2.30599	.000	5.3430	14.6210
		.0000	.2915	3.5810	2.30599	.137	-1.0580	8.2200
		.0000	.1564	-9.8020	2.30599	.000	-14.6210	-5.3430
		.0000	.2915	-6.4010	2.82425	.028	-12.0826	-.7194
		.0000	.2915	3.5810	2.30599	.127	-8.2200	1.0580
		.0000	.1564	6.4010	2.82425	.028	-7.194	12.0826
Asset Quality	Tukey HSD	.0000	.1564	-3.8463	7.76871	.874	-14.9549	22.6476
		.0000	.2915	-3.3673	7.76871	.902	-22.1868	15.4339
		.0000	.1564	3.8463	7.76871	.874	-14.9549	22.6476
		.0000	.2915	4.790	9.51468	.999	-22.5477	23.5057
		.0000	.2915	3.3673	7.76871	.902	-15.4339	22.1868
		.0000	.1564	-4.790	9.51468	.999	-23.5057	-22.5477
	LSD	.0000	.1564	-3.8463	7.76871	.874	-19.4750	11.7823
		.0000	.2915	-3.3673	7.76871	.667	-18.9960	12.2613
		.0000	.1564	3.8463	7.76871	.874	-14.9549	22.6476
		.0000	.2915	4.790	9.51468	.999	-22.5477	23.5057
		.0000	.2915	3.3673	7.76871	.667	-18.9960	12.2613
		.0000	.1564	-4.790	9.51468	.999	-23.5057	-22.5477
Profitability	Tukey HSD	.0000	.1564	-14.1120	13.53265	.554	-46.8627	18.6387
		.0000	.2915	-1.080	18.57405	1.000	-40.0932	40.0932
		.0000	.1564	14.1120	13.53265	.554	-18.6387	46.8627
		.0000	.2915	14.1300	13.53265	.553	-18.6207	46.8807
		.0000	.2915	-14.1120	13.53265	.554	-46.8627	18.6387
		.0000	.1564	1.080	18.57405	1.000	-40.0932	40.0932
	LSD	.0000	.1564	-14.1120	13.53265	.553	-46.8807	18.6207
		.0000	.2915	-1.080	18.57405	1.000	-40.0932	40.0932
		.0000	.1564	14.1120	13.53265	.554	-18.6387	46.8627
		.0000	.2915	14.1300	13.53265	.553	-18.6207	46.8807
		.0000	.2915	-14.1120	13.53265	.553	-46.8807	18.6207
		.0000	.1564	1.080	18.57405	1.000	-40.0932	40.0932
Liquidity	Tukey HSD	.0000	.1564	-2.1493	2.62501	.693	-8.5022	4.2035
		.0000	.2915	-2.4773	2.62501	.616	-8.8302	3.8755
		.0000	.1564	2.1493	2.62501	.693	-4.2035	8.5022
		.0000	.2915	-3.280	3.21497	.994	-8.1086	7.4526
		.0000	.2915	2.4773	2.62501	.616	-3.8755	8.8302
		.0000	.1564	-2.1493	2.62501	.693	-8.5022	4.2035
	LSD	.0000	.1564	-2.1493	2.62501	.693	-8.5022	4.2035
		.0000	.2915	-2.4773	2.62501	.616	-8.8302	3.8755
		.0000	.1564	2.1493	2.62501	.693	-4.2035	8.5022
		.0000	.2915	-3.280	3.21497	.994	-8.1086	7.4526
		.0000	.2915	2.4773	2.62501	.616	-3.8755	8.8302
		.0000	.1564	-2.1493	2.62501	.693	-8.5022	4.2035
Sensitivity to market risk	Tukey HSD	.0000	.1564	-2.8380	4.16644	.776	-7.2453	12.9213
		.0000	.2915	-3.0900	4.16644	.740	-6.9933	13.1733
		.0000	.1564	2.8380	4.16644	.776	-7.2453	12.9213
		.0000	.2915	2.520	5.10283	.999	-12.0975	12.6015
		.0000	.2915	-2.8380	4.16644	.776	-12.9213	7.2453
		.0000	.1564	3.0900	4.16644	.740	-6.9933	13.1733
	LSD	.0000	.1564	-2.8380	4.16644	.776	-12.9213	7.2453
		.0000	.2915	-3.0900	4.16644	.740	-6.9933	13.1733
		.0000	.1564	2.8380	4.16644	.776	-7.2453	12.9213
		.0000	.2915	2.520	5.10283	.999	-12.0975	12.6015
		.0000	.2915	-2.8380	4.16644	.776	-12.9213	7.2453
		.0000	.1564	3.0900	4.16644	.740	-6.9933	13.1733

Based on observed means
The error term is Mean Square(Error) = 130.194
* The mean difference is significant at the .05 level.

6) Correlation and Covariance

TABLE VI. CORRELATION

	Correlations						
	Positivity Rate	Capital Adequacy	Asset Quality	Profitability	Liquidity	Sensitivity to market risk	
Positivity Rate	1						
		Pearson Correlation Sig. (2-tailed)	.693				
		Sum of Squares and Cross-products	.014				
		Covariance	.014				
		N	50				
Capital Adequacy		Pearson Correlation Sig. (2-tailed)	-.326				
		Sum of Squares and Cross-products	-.13901				
		Covariance	-.284				
		N	50				
Asset Quality		Pearson Correlation Sig. (2-tailed)	.077				
		Sum of Squares and Cross-products	9.369				
		Covariance	.191				
		N	50				
Profitability		Pearson Correlation Sig. (2-tailed)	-.176				
		Sum of Squares and Cross-products	-37.961				
		Covariance	-.775				
		N	50				
Liquidity		Pearson Correlation Sig. (2-tailed)	.155				
		Sum of Squares and Cross-products	6.438				
		Covariance	.131				
		N	50				
Sensitivity to market risk		Pearson Correlation Sig. (2-tailed)	-.124				
		Sum of Squares and Cross-products	-8.136				
		Covariance	-.166				
		N	50				

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table VI: Correlation indicates a statistical relationship between variables. It is a static tool that helps in the study to measure all sustainable indicators move in the relation to each other. Hence, the results indicated Capital adequacy's Pearson correlation (.326) with sig (.021) which indicated a weak significant relationship between variables as a benchmark of correlation explains between +, -1.50 to +, -1 for strong

relationship +, -.30 to 0.49 for moderate relationship and +, -.29 and below for weak relationship between variables.

However, other variables in the group indicator show a non-significant relationship between the dependent and Independent variables. Therefore, it is concluded that with the increase of Covid-19 capital adequacy was badly affected and with lower capital adequacy banks can be at high risk of failure and so may be required by the regulatory authority to add more capital.

7) Covariance

TABLE VII. TABLE 4.7: COVARIANCE

Covariance correlation

Priority	Priority Base	1 Spread (2017)	2 Non-markup/interest income to total assets (2017)	3 Return on equity (ROE) (2017)	4 Return on assets (ROA) (2017)	5 Cash and cash equivalent to total assets (2017)	6 Advances net of provisions to total assets (2017)	7 Capital ratio (2017)	8 Commitments & contingencies to total equity (2017)	9 Break up value per share (2017)	10 Total deposit to total equity (2017)	11 Non-performing loan to gross advances (2017)	12 Provisions against NPLs to gross advances (2017)	13 Provision against NPLs to NPLs (2017)	14 Total liabilities to total assets (2017)					
Priority Base	Pearson Correlation Sig. (2-tailed) Sum of Squares and Cross-products Covariance	693	6.176	0.76	-0.221	6.176	-37.622	3.359	-13.261	966	18.216	-11.867	-1.656	-12.345	4.816	9.326	7.481	3.264	-1.386	1.484
N		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50

Table VII: the study examined indicators that were developed in SPSS with the help of transform variables that also contains sub-variables. In this correlation variance, all variables are openly explained to check the impact of covid-19 on sustainable factors. As a result, this analysis highlighted the impact on Capital adequacy which is explained by commitments & contingencies to total equity lower the significant impact with negative covariance explained decreasing capital adequacy in increasing covid crisis. Similarly, non-markup that is variable of sensitivity to market risk indicates a negatively significant and weak relationship with covid-19 having values of correlation (.413) with Sig of (.003) and Covariance (-.273). However, Investment to total assets of liquidity indicators shows a positively significant and weak relationship with covid-19.

8) Sustainability indicators in Time line of Pre and Post Covid-19

The illustrations in Figure X to XIX shows performance of various sustainable indicators of every bank individually taken under consideration in this study.

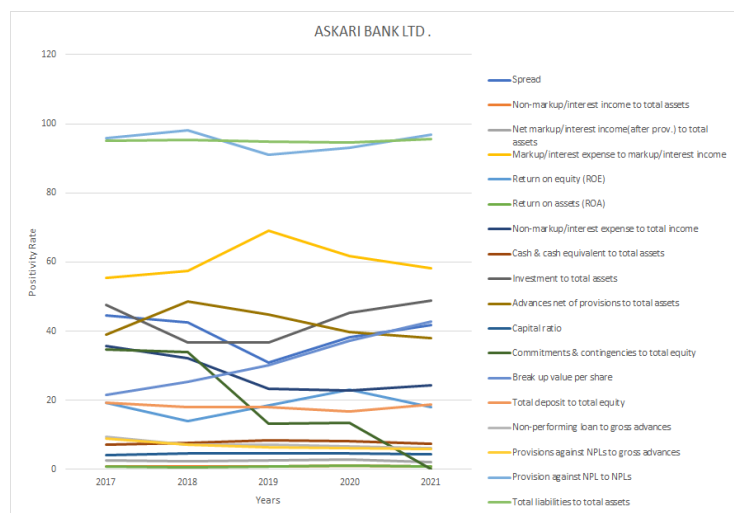


Fig 3 Askari Bank LTD

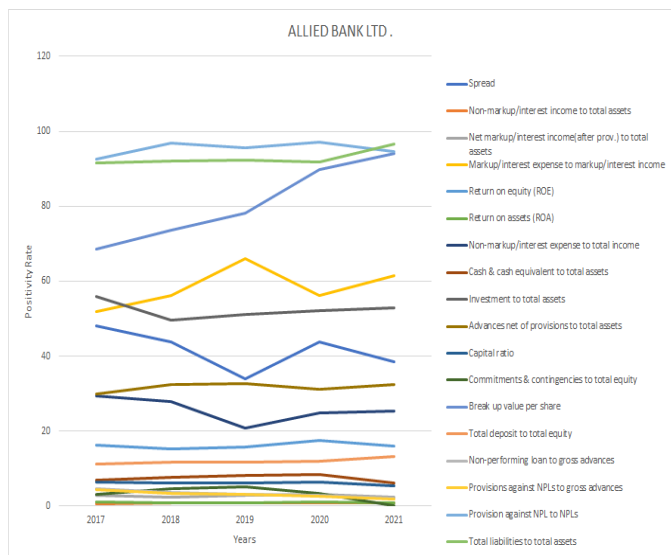


Fig 4 Allied Bank LTD

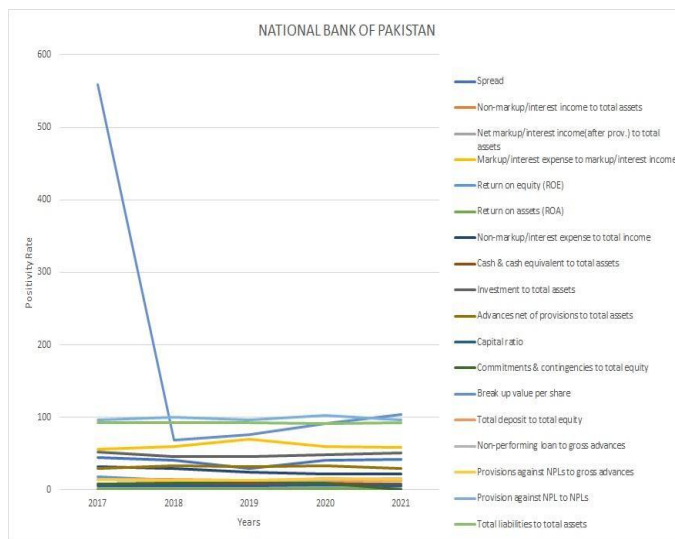


Fig 7 NATIONAL BANK OF PAKISTAN

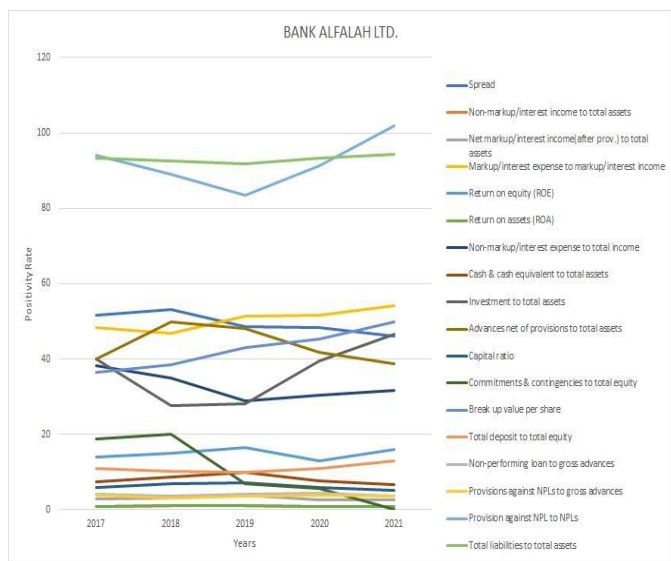


Fig 5 Bank AL-FALAH LTD

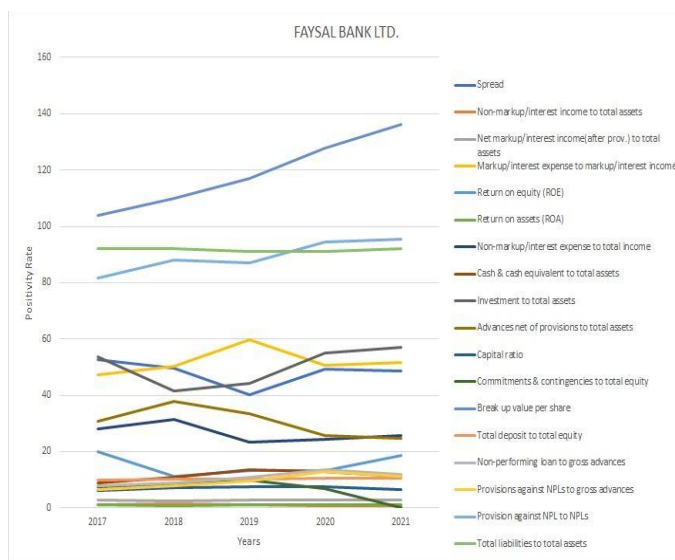


Fig 8 FAYSAL Bank LTD:

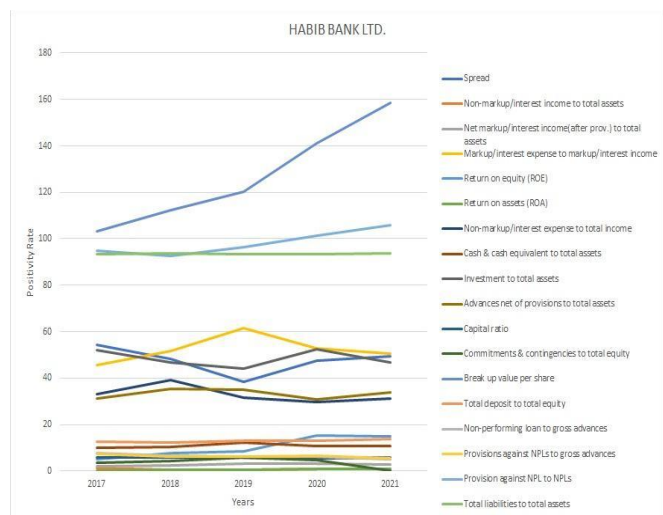


Fig 6 Habib Bank LTD

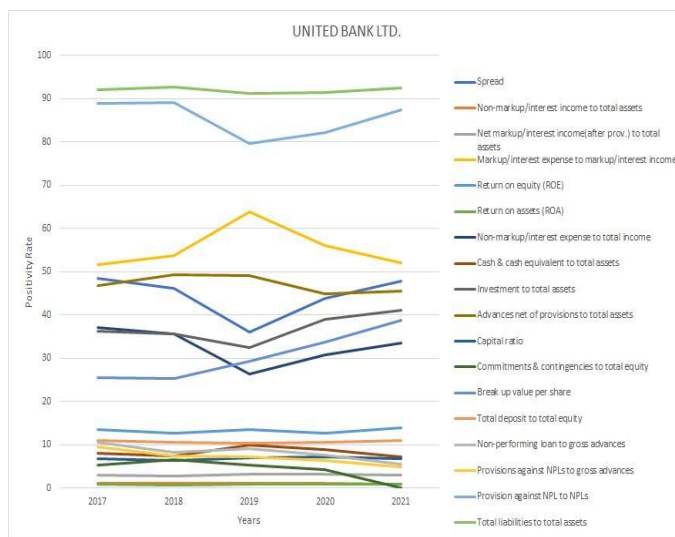


Fig 9 UNITED BANK LTD

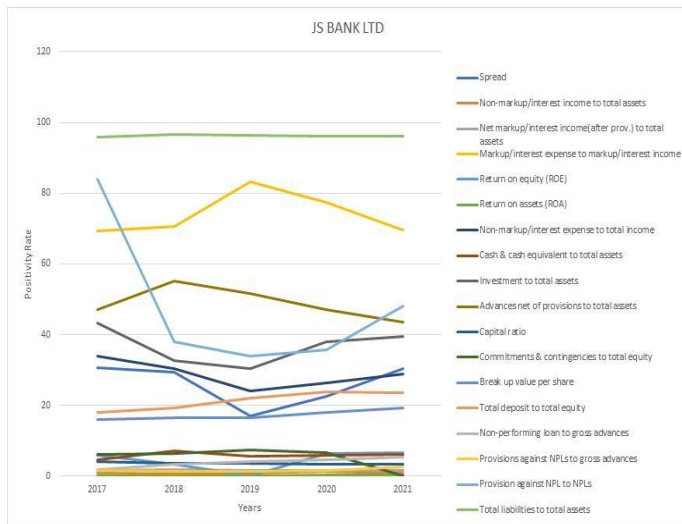


Fig 10 JS Bank LTD

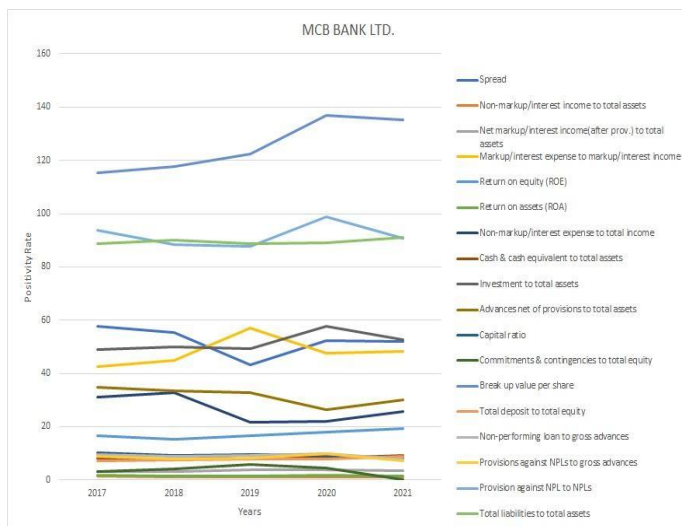


Fig 11 MCB BANK LTD



Fig 12 Silk Bank LTD

9) Summary

Sustainability is an important component of every bank to stay profitable. Sustainable indicators for the banking sector of Pakistan are given by the Central bank (State bank of Pakistan) in CAMEL’S Framework. Sustainability brings loyal customers and investors to the banks. The research by

Begoña Torre Olmo (2021), shows the bank has to be sustainable to stay more profitable.

The financial sector of Pakistan is essential to an economy's efficient operation. It focuses financial resources on the real estate market, promoting capital formation and streamlining financial exchanges. Economic progress requires a strong and stable financial system (Ref: SBP article current Landscape of the Banking Sector and Emerging Trends).

The research study empirically investigated the impacts of covid-19 on the sustainability of the banking sector of Pakistan & CAMELS’ framework has been applied for sustainable indicators that abbreviated “C” as Capital adequacy Ratio, “A” as asset quality, “M” as Management, “E” as Equity, “L” as Liquidity and “S” as sensitivity to market risk.

The “M” management factor has been removed from the objective due to the non-accessibility of required data or information. Consequently, the result of this empirical analysis was based on five objectives that cover only CAEL’S framework (State bank of Pakistan, off-site supervision), which is also part of CAMELS’ Framework and explained by the state bank of Pakistan.

V. CONCLUSION

Sustainability is critical to the success of any bank. The State Bank of Pakistan provides five sustainable metrics for Pakistan's banking industry (SBP). These five indicators are known as CAELS, which stands for Capital Adequacy Ratio, Asset Quality, Earnings, Liquidity, and Sensitivity to Market Risk. The results of our study show Profitability and liquidity has a positive relationship with the positivity rate of COVID-19 case. Whereas, Capital adequacy ratio has a negative relationship with the positivity rate of COVID-19 cases.

The profitability of the COVID-19 bank has grown. Banks received more money from other task than they did through markup prices. Furthermore, during the pandemic, the banking industry boosted its investment in secure assets rather than growing its loans, as banks do not want to risk their assets in times of uncertainty, and therefore the CAR was reduced.

This research is based on financial data from banking institutions collected over a five-year period. Only ten of the thirty-one banks in Pakistan were chosen for data analysis. This study's data is only accessible in individual form, not aggregate form. The study only looks at traditional banks. Furthermore, this study indicates the impact of the Pakistani banking business, whereas Covid-19 has had an impact on more than simply the financial sector. This research is only valid till 2022.

The impact of COVID-19 on the banking sector's sustainability has been fully recorded in this research; nevertheless, significant information is still absent since the "M" part of the CAMELS Framework is missing. As a result, the CAEL framework has taken its place. The CAMELS framework is currently recognized as a work in progress. In

addition, quarterly data may give more exact results regarding the issue, which may be covered in future research.

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