Empirical Examination for Operational and Credit Risk Perspective – A Case of Commercial Banks of Pakistan

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Abstract
The objective of this study is to evaluate the factors that influence credit and operational risk in commercial banks. Financial data was collected from 11 commercial banks of Pakistan listed in Karachi Stock Exchange (KSE) over the period of 2009-2014. Different statistical tools and techniques are applied to find the cause and effect relationship for the underconsideration issue.The banking sector have faced the rivalry with other financial institutions to grab the attention of the customers and having a considerable competition with other banks. The result has shown that operational risk had significant but negative relation with NPL and operating efficiency but positive and highly significant relationship with bank size. Credit risk had significant and positive regression values with gearing ratio. NPL, operating efficiency and bank size had negative and insignificant relation with credit risk. There was no relationship between gearing ratio and operational risk. However the bottomline of this research suggests that banks play an important role in providing the finance for many of the businesses. Moreover these institutions need more managerial grip and vigilant attitude towards the risk management.

Key Words: Operational Risk, Credit Risk, KSE, Commercial Banks, Pakistan
Jel Classification: C12 C9, E32

1. Introduction

Risk is the uncertainty of an expected outcome. The operational and credit risk are at considerable stance because these two types of risk are associated with financial institution and most specifically in case of banks. These kinds of risks arise due to the internal or external factors and effect the financial institutions according to their intensity.

In the 21st century, most of the businesses face enormous uncertainties/risk in case of different types of activities related to the nature of their work. However, foreign direct investments are of considerable debates in case of cross border transactions and operational and credit risk of banking

industry (Chaudhry *et al.,* 2013). The banking sector in Pakistan is playing a very important role in the economy of the Pakistan.So, the failure of individual bank may effect the economy as well as society (Kolapo *et al.,* 2012). There are tremendous changes observed in the banking sector of Pakistan due to uncertain political environment. Banks are highly volatile towards their operations because the financial services may vary from institution to instituion. However the survival of those financial instituions are possible if they had a competitive edge in their dealing/services. So it is important for banks to manage their risk because they have strong association with the financing or credit line of many of the businesses.

Banking is a business of risk taking because it works as intermediator between depositors and borrowers. Therefore, it may be significantly influenced by credit and operational risks, and if the financial institutions become successful to mange it somehow directly or indirectly, it will result in value creation for banks (Sufian and Chong, 2008; Olweny and Shipho, 2011).

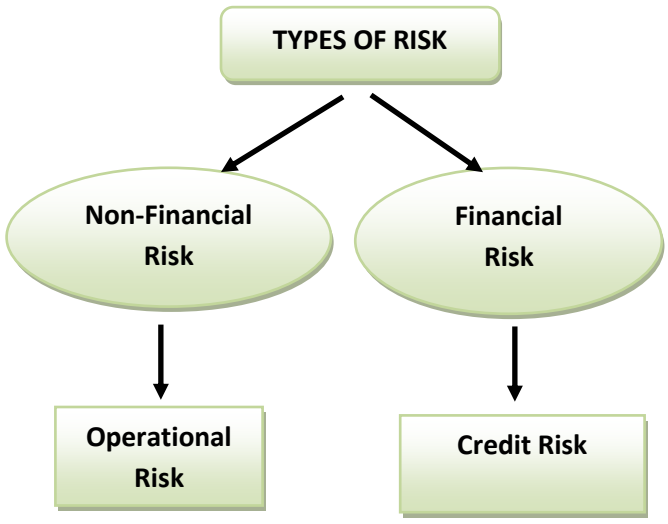
The risk which is faced by the financial institutions can be divided into financial and non financial risks. Financial risk is treated as credit risk and nonfinancial risk is treated as operational risk.

The Basel Committee on Banking Supervision (2000) defines credit risk as *"the potential that a bank borrower or counterparty will fail to meet its obligations in accordancewith agreed terms".* The credit risk is the potential that a bank borrower fails to meet the liability or due amount on due date and agreement. There is always the possibility for a borrower to default from his/her commitment resulting of credit risk. The purpose of the credit risk management is to minimize the risk and maximize the profit.

The operational risk arises due to the human error, financial fraud and natural disasters. Due to the rise of automated technology and increasing trends of e-commerce, the possibility of operational risk has been increased. Operational risk can be reduced by enhancing the risk education for every level of staff and for all the complex operations. The financial institution would need a strong internal control system to overcome the operational risk. Therefore, empirical studies that have investigated risk state that the founder of the firms is often seen as an operational risk (Elliott *et al.,* 2000).

In the recent years, the banks are giving more emphasis to cope with the new types of risk in banking field. Risk refers to the potential adverse variations in future outcomes. The process of monitoring, estimation and assessment, and then exploration for management of risk is called risk management. On the financial plan, management and monitoring of the risk a primary part of the business, but they are not always aware of operational risk management. Operational risk is treated differently from the other risks because it depends upon processing rather than managing the unknown circumstances. Figure 1 represents the operational and credit risk which is considerd in this reseearch.

Figure – 1



However the core objectives of this research is to conclude the appended research questions.

1. To find out the factors that will be influenced on Credit risk.
2. To find out the variables that will be influenced on Operational risk.

2. Literature Review

Risk management practices are considered as key factor for derermining the performance of the organization, and in case of commercial banks these kind of techiniques will forecast the effeiency and effectiveness of management. Risk hedging skills and management functions of planning, organizing, leading, and controlling are especially important for South Asian economies (Mujtaba, 2014) as the public often hears case of corruption (Mujtaba, 2013). A number of studies have provided the discipline in the practice of risk management within the banking sector but there is a variation in researchers' views about this issue.

Prior literature on risk management in banking sector supported by studies of Brown and Wang (2002) investigated the credit risk management in Interstate bank corporations. The sample of this study is from the first Interstate bank corporation. The result showed that hedging duration and credit spreads have considerable impact on risk management practices. Hedging option reduces credit risk. The study provided that credit risk management in the banking sector is very important because banks play an important role in the economy of the country. Barnhill *et al.,* (2002) found that the credit risk factor is a key issue in case of financial stress. However, the organizations can overcome this issue by appropriate portfolio management techniques for getting economies of scale and better results in case returns. Lehar (2005), concentrated on measuring systematic risk in Austria. Data was collected from a sample of the largest 149 international banks from 1988 until 2002. Systematic risk was measured by using correlation and regression analysis and found that the high systematic risks in the banking sector will result in high variations in the expected deficit. He used the stock market information and found the joint dynamics of the Bank's asset portfolio to a sample of international banks. An increase in equity, resulting in a significant decrease in systematic risk. Well capitalised banks further reduces equity not the systematic risk.

The study extend this stream of literature on foreign exchange risk and operational risk along with credit risk pioneer by Al-Tamimi and Al-Mazrooei (2007), as they studied the banking risk by taking the sample of 17 banks of UAE and used a primary source of data through questionnaires and Pearson correlation and regression model. They investigated operational risk, credit risk and foreign risk that is faced by the United Arab Emirates commercial banks. The findings indicated that the practice of risk monitoring, analysis, controlling and assessments matters for a shield against risk and these practices may vary from circumstance to circumstance. Another study support this objective that is Thomas and Dimirovic (2007), who studied the credit risk management of the United Kingdom listed companies. The sample of this study was United Kingdom listed companies over the period from 1990 to 2002. To test the data Regression analysis was used and the result indicated that for measuring the credit risk important factor is the size of the firm and all other factors remain the same or no effect on the credit risk. In case of non-financial firms in Pakistan the derivatives are considered as proper risk management practices (Chaudhry *et al.,* 2014a).

The logical implications and mechanism in case of credit and operational risk are defined by Crook *et al.,* (2007). The study concludes that for commercial banks risk management is of considerable importance because the financing of these institutions is associated with many of the other businesses and hence have a meaningful effect on business terms in any country. Financial reforms are discussed by Richard *et al.* (2008) for banks operating in Tanzania. The key findings of this research showed that the banking sector can overcome the extent of risk by appropriate policy making for credit management.

However, financing or dealing in credit is a major functionality of banks and these are considered as operations of the bank. If the financial institutions need risk management in their operations and lending process then appropriate policy and reforms are necessary to manage the risk.

Some studies found on credit risk management, like Yusaff and Ho (2009), studied credit risk management on selected domestic and foreign organizations in Malaysia. Data was collected from domestic and international firms. The sample size of this study was 15. The survey method was used for data collection. The study found that the reduction of non-systematic risk of loan services, employee career-related training and risk reduction are important strategies for managing credit risk.

This study extends to another type of risk that is liquidity risk by which Khizer *et al.,* (2011) found the factors that effect the liquidity risk. The target population of this study was Islamic and conventional banks of Pakistan. Data were collected from a sample of 6 Islamic banks and 6 Conventional banks from 2006 to 2009. To test the data Regression analysis was used. They found that bank size, net working capital ratio and ROA are positively correlated, whereas in both conventional and Islamic banks have insignificant relation with liquidity risk. ROE is negatively associated but insignificant in conventional banks and significant in Islamic banks. They analyzed that the conventional banks in Pakistan considered the long term financing projects.

Most relevant to this study is a working paper by Sadaqat *et al.,* (2011) which studied financial and nonfinancial business risk. Data were collected from a sample of 28 commercial banks from 2006 to 2009. To test the importance of the factors that affect the financial and non financial risk the multi-variant regression model was used. They found that non-financial and financial risk had a positive relationship with bank size. But operating efficiency build negative relationship with non financial risk, and NPLs ratio established the negative and significant relationship with operational risk. The result proposed that the banking system of Pakistan is well diversified. Moreover the size of market also effect the tendency of risk managemet practices (Chaudhry *et al.,* 2014c).

Nazir *et al.,* (2012) also investigated credit risk management and 10 domestic and foreign banks in Pakistan was the sample. Different statistaical analaysis was performed on the collected data to achieve the aim of this research. The findings of this research relates that Bank size has an insignificant relationship with credit risk in foreign banks, alternatively in domestics banks have positive and significant relationship with the ealier mentioned scenerio. Liquid assets have a positive and insignificant relationship with credit risk with domestic banks and negative but significant relationship in foreign banks. They suggested that credit risk can be reduced if the size of the banks maintain and the banks increase their liquidity.

Different researchers had investigated the risk management in case of different countries and found different phenomenological ideas related to the under consideration issue. Selma *et al.,* (2012) investigated risk management in Tunisian commercial banks. They surveyed 16 commercial banks through a questionnaire. The data were analyzed using descriptive statistics, one sample t-test and Friedman test. The main results are that Tunisian banks are practicing the tools and also known about the importance and role of effective risk management and don't use widely economic capital and market VAR for different risk types. The role of transparency is well known by the Tunisian bankers and also found that risk management is an ongoing process and it will be developed in future, past and present. Risk information is disclosed in the financial statements according to Basel II. However the contribution of information towards risk management is of significant importants (Chaudhry *et al.* 2014b).

Banks registered in stock exachanges of their respective countries are volatile towards the new significant information in the market. However the efficient stock markets may react according to the information of the current market situation and which risk may arise due to unexpected circumstances (Mehmood *et al.,* 2012). According to Dionne (2013), the risk management practices should be deployed by organizations and most specifically by the financial institutions to mange their risk. Financial

institutions must implement policy reforms for under consideration issue. However, application of derivatives for risk management practices is of significant importance.

Masoud *et al*., (2013) studied risk management in Iranian banks. Financial data was collected from 10 Iranian banks from 2006 to 2011.The Regression model is used to test the data and result shown that capital adequacy had an inverse relationship and credit risk found a positive relationship with debt to equity ratio. The size of the bank, debt to equity ratio and Cash to asset ratio, had an inverse relation to liquidity risk and liquidity risk had a positive relationship to capital adequacy. And also found that the size of the bank, cash ratio and capital adequacy had a negative relation to operational risk.

Kanchu and Kumar (2013) also investigated the risk management in the banking sector of India. Data were collected through secondary sources and GAP analysis was adopted to find the results. The conclusion of this paper was that function of risk management depends upon the quality of the balance sheet and size of the bank. The activity of the efficient management information system, networking and computerization are the important factors of the effectiveness of risk management. Level of risk and level of performance may vary from person to person as the individual traits varies (Mehmood *et al.,* 2017). In case of accounting and management perspective, risk management is of considerable debate and hence influence the decision making of the organizations and most specifically in case of commercial banks (Hall *et al.,* 2015). However, corporate risk are of managerial concern and should be heighted and addressed for proper administarionm and for attaining economies of scale (Garcia *et al.,* 2015). In the consideration of the earlier mentioned detailed literature in case of underconsiderastion research tag line, there is a need to purify the decision in case of Pakistan.

3. Research Methodology

This study investigates operational and credit risks in commercial banks of Pakistan. The study examines the research explainations with explanatory approach.

3.1. Research Paradigm

The paradigm philosophy is the underlying assumption and intellectual structure upon which most research is based upon. However, in relation to positivism, this research is purely based on quantitative data which is collected from the annual reports of commercial banks of Pakistan.

3.2. Types of Research

The study based on the secondary data and purely a quantitative research. Quantitative research provides fundamental connection between empirical observations and mathematical expressions.

3.3. Study Design

This study adopted the cross-sectional study design and is based on analytical theorm to test the hypothesis and find the results. In Pakistan there are many banks – commercial, Islamic, foreign, specialized – operating in Pakistan. However, in this study, our target population is commercial banks of Pakistan.

3.4. Hypothesis Development

On the basis of earlier mentioned litereature, the gap is identified and the following hypotheses are generated for empirical analysis.

H1: *Bank size will influence the Credit risk/ Operational risk.*
H2: *Gearing Ratio will influence the Credit risk/ Operational risk.*

H3: *Operating Efficiency will influence the Credit risk/ Operational risk.*
H4: *NPLs ratio will influence the Credit risk/ Operational risk.*

3.5. Variables Operationalization

This study is based on two dependent variables that is Credit risk and Operational risk. Operating efficiency, Bank's Size, NPLs Ratio and Gearing Ratio are all treated as independent variables. Credit Risk is used a proxy of total debt/total assets. Operating Risk is used a proxy of Return on Assets. Banks Size is used a proxy of Logarithm of Total Assets and where as Gearing Ratio is used a proxy of Total Debts/Equity. NPLs Ratio is used a proxy of Non performing loans/total loans and Operating Efficiency is used as a proxy of Total operating expenses / Total Assets.

3.6. Data Collection and Technique

"Sampling is a process of selecting a few from bigger to become the estimating or predicting the prevalence of unknown piece of information or outcome regarding bigger group". There are almost 19 commercial banks working in the banking sector of Pakistan. The sample size of this study is 11 commercial banks of Pakistan. The time period is past six years financial announcement of selected commercial bank. The data is obtained from the official websites/ the annual reports of the banks and other related data are obtained from the Karachi Stock Exchange (KSE).

Simple random technique is used to select a sample size. Simple random technique is the basis of the sampling technique for selecting the few from a bigger group in which all units are having an equal chance of selection. The fish bowl method was used for selecting the sample.

For this study correlation and regression analysis are used to test the importance of the factors / variables that affect Credit Risk and Operational Risk. E-Views software is used to run the model specified in this study.

To find out the variables that influenced the Credit Risk and Operational Risk, the following two models are generated by keeping in view the literature associated with this research.

Model (A):

Credit Risk= α + β_1 (Bank Size) + β_2 (Gearing Ratio)+β_3(NPLs Ratio)+β_4(Operating Efficiency)

Model (B):

Operational Risk= α + β_1 (Bank Size) + β_2 (Gearing Ratio)+β_3(NPLs Ratio)+β_4(Operating Efficiency)

4. Empirical Results:

Table 1 shows the descriptive statistics of variables. The Mean is also called average is dividing by the sum of all observed values by the no of observation n, i.e. CR= .006, GR= .89, BS= 12.260, NPL=.058, OE=.026 and OPR=.886. The Median is middle value i.e. CR= 0.0094, GR= .928, BS= 12.50, NPL=.043, OE=.026 and OPR=.928

Table 1 - Descriptive Statistics:

	CR	GR	BS	NPL	OE	OPR
Mean	0.006423	0.896813	12.26015	0.058710	0.026082	0.885980
Median	0.009450	0.928045	12.50934	0.043557	0.025922	0.928396
Maximum	0.040600	0.974324	14.23280	0.317360	0.075636	0.974324
Minimum	-0.092000	0.221900	9.901686	0.000000	-0.040848	0.092600
Std. Dev.	0.021109	0.113333	1.004702	0.059051	0.015049	0.131995
Skewness	-2.324633	-3.999390	-0.479484	2.127595	-1.839295	-4.000499

Kurtosis	10.14912	21.54358	2.519408	8.518612	13.77688	21.84611
Jarque-Bera	199.9954	1121.574	3.164121	133.5448	356.6011	1152.778
Probability	0.000000	0.000000	0.205551	0.000000	0.000000	0.000000
Sum	0.423949	59.18968	809.1696	3.874842	1.721435	58.47466
Sum Sq. Dev.	0.028964	0.834878	65.61271	0.226659	0.014720	1.132476
Observations	66	66	66	66	66	66

The Std. Deviation gives the idea how close the entire set of date to the average value i.e. CR= .021, GR= .1133, BS= 1.0047, NPL=.059, OE=.015 and OPR=.131. It also shows the minimum, maximum and sum of the values. While skewness refer the lack of symmetry in frequency distributionand table shows that only NPLs is positively skewed and all other variables are negatively skewed. KURTICES shows the peakedness of frequency distribution curve. The frequency curve of data is highly peaked it is laptokurtic. The Jarque-Bera represents the normality of data. So the probability shows that data is not normally distributed.

Table 2 - Correlation Matrix:Credit Risk

	CR	BS	GR	NPL	OE
CR	1				
BS	0.646888*	1			
GR	0.188448**	0.463238	1		
NPL	-0.46969	-0.42485	-0.41013	1	
OE	-0.37002*	-0.10177	0.314511	0.118879*	1

- ** is showing siginicance at 1% level of significance*
- *** shows significance at 5% level of significance*

The table shows that Credit Risk and Bank size are strong and positively correlated, and gearing ratio have week and positive corraltion but operating efficiency have negative partial correlation with Credit Risk. NPL has a negative relation in case of underconsideration issue. However the results also indicates that operationg effiency and credit risk have significant but negative relation with each other. Moreover this type of relationship confirms that if commercial banks have strong and contigent operating effeiency then they may have control over the credit risk and vice versa.

Table 3 - Correlation Matrix: Operational Risk

	OPR	BS	GR	NPL	OE
OPR	1				
BS	0.409513*	1			
GR	0.777768*	0.463238	1		
NPL	-0.55603**	-0.42485	-0.41013	1	
OE	-0.01855**	-0.10177	0.314511	0.118879	1

- ** is showing siginicance at 1% level of significance*
- *** shows significance at 5% level of significance*

The table shows that operational risk and gearing ratio are strong and positively correlated and bank size have significant and positive corraltion. But operational risk have negative partial correlation with NPL and operating efficiency. Operating efficiency have relationship with weaker intensity in case of operational risk but this relationship is negative in nature according to the defined results. However the result are emphasizing on the phenomina that bank size is of considerable debate while evaluating operational risk. The findings also confirms that the financial institutions – commercial banks – having large size are in great hurdle to manage their opertaional risk in a significant way and vice versa. Moreover the negative sign of NPL ratio with operational risk confirms the hypothesis of research which depict a significant impact of both of these at bottom line.

4.1. Regression Results

Table 4 - Model A (Credit Risk)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.277454	0.264554	1.048759	0.2984
BS	-0.011385	0.017537	-0.649212	0.5186
GR	0.932622	0.274977	3.391630	0.0012*
NPL	-0.524297	0.427260	-1.227116	0.2245
OE	-2.204488	1.474330	-1.495247	0.0100*
R-squared	0.722403	**Akaike Info Criterion**		-2.357440
Adjusted R-squared	0.704200	**Schwarz Criterion**		-2.191557
F-Statistic	39.68568	**Hannan-Quinn Criter.**		-2.291892
Prob (F-statistic)	0.000000*	**Durbin-Watson Stat**		1.989983
Prob (Wald F-statistic)	0.000000*	**Wald F-Statistic**		27.41334

- *is showing siginicance at 1% level of significance*

The empirical findings of this model of business risk depicted 0.70 value in case of Adjusted R square which meant that 70% of the variation are due to the hypothesized model of this particular research which confirms the relevancy of the results. The regression model shows F-Statistics = 39.685, p<.005, which means that the model is significant. As can be seen, Credit Risk had a significant and positive regression values with Gearing Ratio. NPL and bank size had negative and insignificant relationship with Credit risk. However the significant and negative relation of operating efficiency with credit rik once again confirm the situation that commercial banks are having greater operating efficiency may outperform the rest of the elements that have their impacts on the said phenomena – credit risk. For debt financing for banks to maintain the gearing ratio, it means that gearing ratio influence the credit risk because the high gearing ratio means banks rely on the borrowing which is most risky. Durbin Watson values are within the range of 1.5 to 2.5 *i.e.* Durbin Watson =1.98, which indicates that the model is significant. The equation for the regression line is:

Credit Risk= 0.277454-0.011385 (Bank Size) +0.932622 (Gearing Ratio)-0.524297 (NPLs Ratio) -2.204488 (Operating Efficiency)

Figure 5 - Model B (Operational Risk)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.108994	0.030961	-3.520416	0.0008
GR	-0.016284	0.022700	-0.717354	0.4759
NPL	-0.084644	0.037309	-2.268738	0.0268**
OE	-0.360943	0.102017	-3.538067	0.0008*
BS	0.011778	0.002743	4.294311	0.0001*
R-squared	0.652601	**Akaike Info Criterion**		-5.546283
Adjusted R-squared	0.623263	**Schwarz Criterion**		-5.380400
F-Statistic	18.83590	**Hannan-Quinn Criter.**		-5.480735
Prob (F-statistic)	0.000000*	**Durbin-Watson Stat**		1.656003
Prob (Wald F-statistic)	0.000120*	**Wald F-Statistic**		6.895028

- ** is showing siginicance at 1% level of significance*
- *** is showing siginicance at 5% level of significance*

The empirical findings of this model of business risk reveals 0.62 value of adjusted R square which represents that 62% variations due to the variables in hypothesized model, and indicates a significant result in case of under consideration phenomena. The regression model shows F-Statistics = 18.835, p<.005 which means that the model is significant. As can be seen, the Operational Risk had a significant but negative regression values with NPL and Operating efficiency, and a positive and highly significant relationship with bank size. The operating efficiency means to measures the least deployment of resources to alternatively achieve the maximum output. Operational risk had insignificant and negative relations with gearing ratio. Durbin Watson values are within the range of 1.5 to 2.5 i.e. Durbin Watson =1.656 which indicates that the model is significant. The equation for the regression line is:

Operational Risk= -0.108994+ 0.011778 (Bank Size) -0.016284 (Gearing Ratio)-0.084644 (NPLs Ratio) -0.360943 (Operating Efficiency)

5. Conclusion

This study explored the variables that may affect credit risk and operational risk. However, this study applied credit risk and operational risk as dependent variables and operating efficiency, bank size, the NPLs Ratio and gear ratio as independent variables. This study has identified the variables that are of considerable impact and are of signiffect importance in case of credit and operational risk in commercial banks.

The results have shown that operational risk had a significant but negative relation with NPL and operating efficiency, and positive and highly significant relationship with bank size. The operating efficiency means to measures the least deployment of resources to alternatively achieve the maximum output. For debt financing the banks should maintain their gearing ratio so that their credit line for the borrowers remain at considerable level. However, operational risk had an insignificant and negative relation with gearing ratio. Credit Risk had significant and positive regression values with Gearing Ratio. NPL and Operating efficiency and Bank size had negative and insignificant relation with Credit risk. It means that gearing ratio influences the credit risk because the high gearing ratio means banks rely on borrowing which is most risky. Quality of assets and size of bank has a major influence on operational risk, but credit risk has no effect by these variables. Finally, commercial banks of Pakistan should reduce

risk by controlling the size of banks and also they must participate in the portfolio of assets and capital structure.

The recommendation of this study is that if we pursue proper bank regulations, and then the regulations should be backed up by sound credit analysis, and provision for suitable situation of credit loans. However, in order to avoid distorting the true presentation of the financial position of the banks on their balance sheets and compensation for the activities of the portfolio, these institution should bring under consideration the credit analysis and also account for the seasonal and cyclic phases of the economy as well as credibility of loan along with appropriate portfolio management. Moreover efficient techniques of evaluation of loans (ELAT) are those that contain the conventional investment analysis and measurement of risks. Therefore, commercial banks should establish competent and robust credit risk and operational risk management practices units that are governed by unanimous and enforceable policies. These policies may include proper checks and balances for financing, proper asset back policy for loaning and best implementation of KYC – know your customer. Furthermore, training and development, referesher courses and updated knowledge about risk management practices may enable the banks and their administarion to perform their duties in a siginificant manner.

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