Transformation of agriculture risk management

The new horizon of regulatory compliance in farm credits

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Abstract

Purpose – The purpose of this paper is to investigate the balanced role of internal and external compliance in risk evaluation process of specialized agriculture financing. The authors examine the adaptive behavior of risk managers to determine the role of proposed transformation for risk monitoring (RM) and control process in risk mitigation and avoidance of agriculture credit failure.

Design/methodology/approach – A self-administered survey was conducted to collect data from 353 risk-related officers and managers in Zarai Taraqiati Bank Limited (ZTBL) Pakistan. The authors used a previously tested scale for the main constructs. The descriptive analyses were used to gauge the model capacity for determining the strength of proposed risk patterns in agriculture risk management.

Findings – The results reveal that risk evaluation process in ZTBL is reasonably efficient in mitigating risks. Given the sensitive nature of farm credit, there is a need of fundamental reforms in risk policy manuals in line with central bank's agriculture prudential regulations and Basel-III standards. The results fully support *H1* and *H2*, while *H3* is partially validated. The result patterns indicate serious issues in risk evaluation process in agriculture finance that is causing higher delinquency in farm credit.

Research limitations/implications – Based on highlighted issues, the authors recommend valuable guidelines in the RM review system for agriculture financing products at ZTBL.

Practical implications – The authors propose remodeling of agriculture risk management and offer valuable insights to the agriculture financial regulators and government in taking policy initiatives in the pre-and-post agriculture risk evaluation process. The proposed model enables RM process to improve farm credit delinquency, particularly in ZTBL and other agriculture banking networks in commercial banks.

Originality/value – This is the first study to empirically investigate RM evaluation process in agriculture risk management of ZTBL in Pakistan, thus, offers new horizon of farm credit regulatory compliance in agricultural sector of Pakistan.

Keywords Basel regulations, Nonperforming loans, Agriculture risk management, Delinquency ratio, Risk evaluation process

Paper type Research paper

1. Introduction

Agricultural productivity is critical to farmers' ability to build and maintain financial strength and contribute to Pakistan's economy (Saqib *et al.*, 2016). Farm credit plays an important role in well-timed cultivation processes while maintaining adequate supplies of agriculture inputs to its buyers (Wang *et al.*, 2009). In Pakistan, the government has emphasized domestic agriculture as a means to manage valuable foreign reserves. The Central Bank of Pakistan has been instructed to formulate a certain portion of banks' investments in the agriculture sector. For this purpose, commercial banks in Pakistan have established specialized agriculture divisions to facilitate farm credit for crops in all three seasons (Ullah *et al.*, 2015). However, a report on agriculture credit support programs in the quarterly performance review of the Central Bank of Pakistan (2017) indicated an increasing default ratio in the agricultural sector that is creating serious challenges for farm credit risk

management and deteriorating delinquency ratio of commercial banks. The underlining of agriculture risk is mainly responsible for the failure in the repayments of farm credit. In this regard, Saqib *et al.* (2016) revealed main sources for systematic agriculture risks i.e. crop diseases, temperature volatility, variability in the supplies and prices of agricultural inputs, pollution, natural disasters and instable market conditions. Complex financing mechanism for agriculture credit and uncertainty in market receivables pose major financial constraints, resulting in a long cash conversion cycle that places undue stress on working capital. Additionally, distinct risk aversei attitude of farmers are also indicated as the main reason of higher agriculture credit risk (Ayaz *et al.*, 2011; Binici *et al.*, 2003). Consequently, internal agricultural credit policies of the banks should devise certain risk management policies for efficient evaluation and monitoring of farm credit. However, limited literature is available on the adoption of agriculture risk management in pre-and-post credit evaluation and monitoring process.

Agriculture is a leading sector in Pakistani economy and its credit share along with related finance in the investment of commercial banks is on continual rise (Ullah *et al.*, 2015); but still banks are following conventional methods of risk management by extending farm credit against fixed or liquid assets as primary collateral (Saqib *et al.*, 2016). Nonetheless, a plethora of literature has explored the various challenges in agricultural risk management including land as primary security (Hussain and Thapa, 2012), risk coverage through liquid assets including jewelry (Akram *et al.*, 2008) and personal guarantees of farmers or guarantors (Winter-Nelson and Temu, 2005). Moving the field forward, we attempt to remodel agricultural risk management by extending important risk factors including understanding of risk management (URM), risk assessment and analysis (RAA), risk identification (RI), risk monitoring and review (RMR), credit risk assessment (CRA), operational risk assessment (ORA), liquidity risk assessment (LRA) and risk management practices (RMPs). Findings of this study can be used to guide financial regulators and government in taking policy initiatives toward efficient risk management for pre-and-post agriculture risk evaluation in order to reduce farm credit delinquency.

The remainder of this paper is organized by offering review of literature, which describes the research propositions to be evaluated and then explains transformation of agriculture risk management. The methodology section describes the population, sampling and the analyses of data to provide empirical evidences. Thereafter, the results, based on analyses and a discussion of the results, are presented. This study concludes with the discussion of the policy implications and guidelines for agriculture credit risk analysts and recommendations for farmers, risk analysts, policy makers and researchers.

2. Literature review
Bilal *et al.* (2013) differentiated risk and uncertainty, and defined risk as an imperfect knowledge where the possible outcomes of an event can be known and estimated. Risk management is an efficient set of managing risk strategies and credit decision making for identification of events in broader classes of operational, credit, liquidity, market and other risks. This process is further divided into the valuation of data, their reporting, supervision, assessments and control of certain risks. The RMP of commercial credit is mainly comprised of five fundamental pillars. Ngathou *et al.* (2006) outlined the hierarchy of these specialized agriculture RMPs as risk identification, risk measurement, risk mitigation, monitoring and reporting of risk.

The theory of credit risk highlights three major banking risks including hazard or pure risk, financial risk and nonfinancial risk. The financial risk is segregated into market, credit, liquidity, interest rate, foreign exchange, solvency and capital adequacy risks. The nonfinancial risk is deemed as an operational risk. The conceptualization of RMP is theorized by Rosman (2009) who defined it as a four-stage risk evaluation process including URM, RI, RAA and risk monitoring (RM).

2.1 Development in agriculture finance in Pakistan

The economy of Pakistan mainly relies on agriculture and its related products (Ullah *et al.*, 2015). Since its inception, agriculture policy in Pakistan has focused on providing agriculture credit to farmers. In post-independence phase of Pakistan, Agricultural Development Finance Corporation (ADFC) was established in 1952 through a central act of the Parliament for the purpose of enhancing monetary facilities and support to the development and modernization of agriculture sector in Pakistan. With recommendations of the Parliamentary committee on agriculture development, in 1957, the first formal agriculture bank was established in Pakistan named The Agricultural Bank of Pakistan (ABP), which was awarded mandate to grant short-, as well as long-term agriculture loans to the farmers. On February 1961, ADFC and ABP were merged and named as the Agricultural Development Bank of Pakistan (ADBP). Owing to agriculture-focused strategies of the government, ADBP has significantly contributed to meet the agriculture credit needs of farmers across Pakistan. Finally, on December 14, 2002, ADBP was again renamed into Zarai Taraqiati Bank Limited (ZTBL) with new ambitions of the government to support inclusive agriculture growth in Pakistan. In recent years, ZTBL as the sole agriculture-specialized financial institution in Pakistan has supported public policies to uplift the agriculture sector by structuring specialized farm credits for maximizing yields and revenues. Consequently, ZTBL has grown into a large network of 492 branches (till December 31, 2017) across the country to offer a wide range of financial facilities (see Table I) to millions of agricultural borrowers, which are mostly unique from commercial banks and are available for the farmers and the general public.

ZTBL has total assets of PKR220.4bn including equity of PKR82.700bn (till closing of March 31, 2017) by the support of government and general depositors. For the same period, ZTBL has been booked advances of PKR136.2bn including short-term and long-term financing facilities. Despite growth in assets as of March 31, 2017, ZTBL reported a loss of PKR0.09bn against profit before taxes of PKR6.50bn and PKR8.40bn as of December 31, 2016 and December 31, 2015 respectively. This deterioration is backed by the continuous increase in nonperforming loans to Tier-I capital ratio that has increased from 18.7 percent in FY 2015 to 24.8 percent in FY 2016 and 18.8 percent as of March 31, 2017. Consequently,

Description of facilities	Eligible user
Provide platform for government subsidized schemes related to agriculture credit	General farmers
Offer all types of agriculture-specialized deposit accounts	General public
Offer seasonal credit facilities to specialized crops	General farmers
Short-term and seasonal finance to live stocks sectors, i.e. farm credits for fish farming, goat farming, cow farming, poultry farming and dairy farming	Livestock farmers
Medium-term and long-term lease facilities for agriculture-related machinery, tractors and other vehicles	General farmers
Corporate farm credit for industrial supplies like sugar can, wheat and maize cultivators to support credit supplies to sugar mills, flour mills and feed mills accordingly	Exclusive farmers of respective crops
Agriculture research and development labs and field surveyors	Agriculture graduates
Women support schemes (WSS)	Exclusive skilled women of villages
Rural development schemes (RDS)	Exclusive village residents
Modal village establishments	Exclusive village residents
Small dealers and distributors of seeds, pesticides and fertilizers	SMEs related to farm supplies
General public facilities like locker facilities, treasury and interbank transfer, home remittances, utility bills collection	General public

Table I.
Description of credit facilities and eligible users

ROAA ratio has been reduced from 3.0 percent in FY 2015 to 1.6 percent in FY 2016 and 0.2 percent as of March 31, 2017. Owing to the deteriorating asset quality indicators, the auditors have highlighted some serious challenges in risk management function at ZTBL. Due to rising figure of NPLs in FY 2016, gross infection has been increased to 15.8 percent against 12.30 percent in FY15. Simultaneously, net infection has also witnessed an upward trend and reached 14.3 percent in FY 2016 against FY15 where it was 10.9 percent. The current audited indicators clearly signal a need to investigate and find the efficient RMPs, which might improve the quality of agriculture financing. A consolidated transformation is needed to improve RMPs during review and decision making of agriculture financing (Ullah *et al.*, 2015; Saqib *et al.*, 2016; Aimin, 2010). We have addressed this gap by developing a consolidated transformational framework of risk evaluation for agriculture credit reviews and monitoring process.

Different types of risks prevail in the banking sector of Pakistan, including market risk (MR), foreign exchange risk, liquidity risk and credit risk (Shafiq and Nasr, 2010). Past studies have emphasized to make the risk management structures of conventional and Islamic banking in accordance to the specific needs of agriculture credit screening and monitoring process. In this backdrop, we have offered an improved extension of theoretical remodeling of risk management in conventional and Islamic credits as recommend by (Bilal *et al.*, 2013; Khalid and Amjad, 2012; Rehman, 2016). To reduce agricultural financing risk, the credit should be transformed according to the theory of agricultural risk management. This theory outlines major predictors of risk management, i.e. URM, RI, assessment of risk and analysis (ARA), RMR, ORA, LRA, MR, risk governance (RG) and CRA on RMPs. We develop the following research questions to investigate transformational modeling in risk management in the context of specialized agriculture risk evaluation, risk approval and efficient RM process:

RQ1. What are the exploratory presumptions regarding RMPs in specialized agriculture financial institutions?

RQ2. What are the discrepancies in risk evaluation and control process in exiting agricultural risk management?

RQ3. Do the financial institutions have the tendency to remodel their philosophy of risk management to avoid agriculture credit failure?

For specialized agriculture banks like ZTBL, we hypothesized that there should be a dedicated agriculture risk evaluation framework for prudent risk screening in pre credit approval process, and it's monitoring in post credit disbursement period. Therefore, to address these questions, following hypotheses are developed:

H1. Risk evaluation practices, i.e. URM, ARA, RI, RMR, CRA, ORA and LRA have significant relationships with RMPs in ZTBL.

H2. Review of RMPs has a consequential influence on potential RM policies in ZTBL.

H3. ZTBL has adequate regulatory compliance and follows Basel-III standards that have subsequent effect on reframing RMPs.

3. Sampling, collection of data and analysis
The sample of the study includes ZTBL staff who have direct dealing in the compliance of bank's internal and regulator's policy guidelines and have minimum five years experience in branch operations, credits and general administration. For this purpose, respective staff of all branches and zonal offices of Lahore region, i.e. Lahore city, Sheikhupura city and Okara city were approached. We used proportionate approach of stratified sampling method in order to ensure representation of entire targeted population. The modified and calibrated

version of questionnaire was used as recommended by Bilal *et al.* (2013), Rehman (2016), Hassan (2009) and Al-Tamimi and Al-Mazrooei (2007), which is comprised of relevant statements related to specified variables. All the questions were measured on a seven-point Likert scale ranging from "strongly disagree" to "strongly agree." As per recommendation of Ruane (2005), a total number of 375 questionnaires were distributed, out of which 353 filled questionnaire were received. During screening process, 14 responses were excluded owing to incomplete information. The questionnaire included total 79 questions, in which the first 7 questions were related to the demographic characteristics of participants. The rest of the questions pertained to the study variables, 9 questions were related to URM, 7 questions were used to measure ARA, next 6 questions were about RI, 9 questions investigated about RMR, 10 questions asked about CRA, 5 questions were regarding ORA, 11 questions were concerning CRA and final 15 questions were about RMPs. Apart from the first seven questions, all questions were based on descriptive statements, which were measured through seven-point Likert scale. The questionnaire draft was pre-tested and modified as per feedback of experienced panel members and senior risk officers of ZTBL who were not the participants in this research.

The reliability of the scale was tested by using Cronbach's α, while Spearman's correlation was used to investigate the strength and direction of relationship among predictors, and between predictors and endogenous variables. To examine the existence of multicollinearity among predictors, the data were tested using multicollinearity test. All the descriptive tests to measure the role of explanatory variables, i.e. URM, ARA, RI, RMR, CRA and ORA with RMPs were conducted using SPSS-21.

4. Empirical findings
Previous studies have identified eight attributes of RMP, as summarized in Table II. Our overall objective was to determine the extent to which bank's risk compliance staff weighed these attributes, and the relevant importance of these attributes for evaluation and decision making of specialized agriculture credit risk. Table II represents the values derived from descriptive statistics, which reveal that our proposed model has a tendency to reframe agriculture RMP using seven influential and prudent risk functions. In addition, LRA is required to be done through liquidity stress testing and scenario analysis. Similarly, the implications of risk-averse mechanism and Basel-III regulations should be implemented through efficient risk evaluation system.

4.1 Understanding of risk management (URM)
Table III indicates a mean value of 4.74 for the responses on the nine questions regarding URM. The results do not indicate a higher variation between lowest and highest values of

S. No.	Variables	Mean of means	Mean of SD
1	Understanding of risk management (URM)	4.74	1.69
2	Risk assessment and analysis (RAA)	4.67	1.37
3	Risk identification (RI)	4.49	1.56
4	Risk monitoring and review (RMR)	4.84	1.34
5	Credit risk assessment (CRA)	5.41	1.24
6	Operational risk assessment (ORA)	5.20	1.19
7	Liquidity risk assessment (LRA)	5.05	1.26
8	Risk management practices (RMPs)	4.65	1.55

Sources: Derived from the personal survey based on previous studies (Rehman, 2016; Bilal *et al.*, 2013; Hassan, 2009; Al-Tamimi and Al-Mazrooei, 2007)

Table II.
Descriptive statistics of agriculture risk evaluation indicators

Questions	Mean	SD
Is there a common understanding of risk management in ZTBL across the bank?	3.71	0.76
Responsibility of risk management is precisely set out and understood throughout the bank	4.17	1.03
Risk management policy is communicated down the line and well understood by all concerned parties (risk takers, risk reviewers, etc.)	3.89	0.84
Risk management's accountability is precisely set out and understood throughout ZTBL	4.01	0.90
Risk management is important for the success and performance of the ZTBL	5.78	1.07
Most sophisticated techniques have vital application in risk management	5.49	1.01
ZTBL aims at expanding applications of the modernized risk management technique	4.57	0.82
This is important for ZTBL to accentuate on incessant review and assessment of the techniques used in risk management	5.32	1.06
Costs or expected losses would be reduced by the full compliance of risk management in all credit reviews	5.69	1.03
Average	4.74	

Table III. Understanding of risk management (URM)

the nine questions. The lowest mean is 3.71 for question 1, concerning the common URM across ZTBL. The highest mean is 5.78 for question 5, in which respondents viewed that the risk management is important for the success and performance of ZTBL. The answers of respondents indicate a common URM throughout ZTBL. The consolidated response of URM gives obvious indication that ZTBL staff have enough capabilities and knowledge of risk management that gives them prudent direction to manage the risk. In addition, the standard deviations of nine questions have small values that show data points are closer to the mean values. These findings supported the results of past studies in which similar pattern of risk management in commercial, Islamic and foreign banks has been revealed for URM (Bilal *et al.*, 2013; Hassan, 2009; Rehman, 2016).

4.2 Assessment of risk and analysis (ARA)
The mean of the responses on the seven questions pertaining ARA is 4.7 (Table IV) that indicates that the staff of ZTBL is efficient in ARA. The values do not indicate big difference between the lowest and the highest mean values of questions. Question 2 has lowest mean of 4.5 showing that ZTBL evaluates risks by adopting qualitative analysis (e.g. low, moderate and high). Question 1 has highest mean value of 5.0, indicating that ZTBL regularly evaluates the probability of risk in all credit decision. These results are consistent with the findings of Hassan (2009) who investigated risk management in Islamic credit, and Bilal *et al.* (2013) who examined risk evaluation in commercial credit. Furthermore, only question 7 indicates a higher standard deviation value of 1.21. This higher variation indicates that the

Questions	Mean	SD
ZTBL evaluates the probability of risk occurrence	5.00	1.06
ZTBL evaluates risks by adopting qualitative analysis method (e.g. high, moderate and low)	4.49	0.91
ZTBL evaluates risk by implementing quantitative analysis method	4.72	0.88
ZTBL analyzes and evaluates the opportunities that it has to achieve objectives	4.76	0.95
ZTBL's response to analyze risk is comprising of an evaluation of the costs and benefits of each relevant risk	4.55	0.76
ZTBL's response to investigate risk includes ranking of risk and selecting those that account for an application of active management	4.59	1.02
ZTBL's response to analyze risk includes ordering risk where there are resource restraints on the implementation of risk handling	4.63	1.21
Average	4.68	

Table IV. Assessment of risk and analysis (ARA)

staff of ZTBL does not show adequate prudency in analysis of risk including "ordering risk." The ordering risk represents certain constraints of resources in the implementation and handling of different credit risks. The identification of risk ordering and mitigation through respective credit covenants should be explicitly incorporated in the credit policy manual of ZTBL. Apart from question 7, all the other questions had small values of standard deviation, based on which, we argue that ZTBL's respective staff equally analyze the RAA process during the review of all agriculture credit decision. This represents a positive response to the first research hypothesis that can also be witnessed in Table IV.

4.3 Risk identification (RI)

The mean value of questions regarding RI is 4.5, which shows that risk management staff of ZTBL clearly identifies the risks related to different short-term and long-term agriculture products. The response pattern of six questions about RI reveal that continuous training of banking staff can improve their capabilities to easily identify the potential risks. Question 2 had the highest mean value of 4.78, indicating that risk identification is a continuous process in ZTBL at transactional portfolio level. Question 3 had the lowest mean value of 4.05, signifying a difficulty in RI and ranking at ZTBL. It reveals that ZTBL staff is assertive about their capabilities to recognize risks relevant to agriculture finance products. The results of standard deviation shown in Table V indicated the lowest value of 0.86; it shows that data points are close to the mean of 4.05. The highest standard deviation value of 1.13 for question 6 demonstrated that the data points are far from the mean value of 4.40. This higher dispersion shows that the development and application procedure for systematic identification of investment opportunities at ZTBL is not up to the mark as per regulatory requirements. Hence, the management should improve it for the effective RI process. In consolidation, the results of questions related to RI are consistent with the extant literature that deems RI to be a prime element in effective RMP (Rehman, 2016; Hassan, 2009).

4.4 Risk monitoring and review (RMR)

Table VI represents the answers of respondents on the set of questions related to RMR. The mean value of responses for the nine questions is 4.85 that specifies the existence of an efficient risk monitoring and reporting system in ZTBL. This can be further validated from overall mean value that shows no significant difference among all nine questions. It demonstrates that the respondents have given similar weightage to all the questions related to RMR. The results showed the lowest mean value of 4.59 for question 5, indicating that the ZTBL's risk team respond to the identified risks and make action plans for proposal acceptance or rejection with certain credit covenants. Question 6 had the highest mean value of 5.14, which shows that management of ZTBL monitors the implementation of risk management policy and makes necessary adjustments as an effort

Questions	Mean	SD
Comprehensive and systematic identification of risk is carried out at ZTBL with risk relating to each of its affirmed goals and objectives	4.70	1.08
Risk identification is a continuous process in ZTBL at transactional and portfolio levels	4.78	1.11
The ZTBL finds it difficult to identify, and rank its main risk	4.05	0.86
Changes in risk are recognized and identified with ZTBL's roles and responsibilities	4.71	1.02
ZTBL is completely aware about the strengths and weaknesses of other banks risk management system	4.34	0.91
ZTBL has developed and applied procedures for the systematic identification of investment opportunities	4.40	1.13
Average	4.49	

Table V.
Risk identification (RI)

Questions	Mean	SD
Effectiveness of risk management is an integral part of routine management reporting and monitoring at ZTBL	5.09	1.09
Control level is appropriate at ZTBL for the risk that it deals	4.98	0.97
ZTBL supports the effective management of risks regarding processes of reporting and communication	4.90	0.91
ZTBL's response to risk includes an evaluation of the effectiveness of the existing controls and risk management responses	4.80	0.88
ZTBL's response to risk includes action plans in implementing decisions about identified risk	4.59	0.87
Management of ZTBL monitors the implementation of risk management policy and make necessary adjustments	5.14	1.07
Management of ZTBL regularly monitors the effectiveness of risk management system	4.69	0.94
The organizational structure of ZTBL strengthens monitoring and control over risks being taken	4.68	0.99
Chief risk officer/risk management function is responsible for risk monitoring within your bank (ZTBL)	4.77	1.04
Average	4.85	

Table VI. Risk monitoring and review (RMR)

to avoid nonperforming assets. The lowest standard deviation value of 0.88 signifies that the data points have less variation and are close to the mean value of 4.80. Question 1 showed the highest standard deviation value of 1.09, indicating that the effectiveness of risk management (ERM) is an integral part of routine management reporting and monitoring in ZTBL. These results are consistent with the findings of Al-Tamimi and Al-Mazrooei (2007) who concluded that banks in the UAE are somewhat efficient in risk management but still lag behind the foreign banks. The results also confirm the findings of Rehman (2016) who found risk analysis to be an equally important element in the RMP of conventional and Islamic banks in Pakistan.

4.5 Credit risk assessment (CRA)

CRA is the most important phase of RMPs for regulatory compliance. Table VII represents responses to the ten questions pertinent to CRA. The mean value of responses summed up

Questions	Mean	SD
Creditworthiness analysis is undertaken at ZTBL before grant of loans	5.55	1.09
Specific analyses have been undertaken before grant of loan at ZTBL includes the client's characters, capital, creditworthiness, cash flows and collateral	5.77	1.01
Classification of the borrower has been made according to calculated risk factor (as per risk rating) in ZTBL	5.49	1.12
Credit policy commensurate with the overall risk management policy	5.38	0.99
Borrowers' updated information has been made from credit information bureau of central bank	5.57	1.06
Management of ZTBL has allocated credit limits for different sectors, business segments, and geographical locations in order to effectively manage credit concentration	5.41	0.91
Monitoring of credit risk and reporting to higher management is regularly taken place at ZTBL	5.29	0.87
Credit risk management committee used to exercise credit risk management function in ZTBL	5.03	0.83
Credit administration department of ZTBL ensures proper approval, completeness of regulatory documentation, receipts of collateral mortgages and approval of exceptions before credit disbursement	5.34	0.96
Credit risk strategy and credit policy are periodically reviewed for improvement by the board of directors in ZTBL	5.14	0.89
Average	5.41	

Table VII. Credit risk assessment (CRA)

to be 5.41, which gives evidence about the efficient management of risk for short-and-long nature agriculture products. Question 8 had the lowest mean value of 5.01, which indicate that a specialized credit risk management committee is appointed in ZTBL that is responsible to oversee risk functions in credit approval process. Question 2 showed the highest mean value of 5.77, which indicates that specific analyses are undertaken at ZTBL in which the client's character, capital, creditworthiness, cash flows and collateral are examined in the credit approval process. This is in line with the study of Bilal *et al.* (2013) who indicated five credits Cs as prime elements in the CRA process. Question 8 had the lowest standard deviation value of 0.83, which signals that data points are close to the mean value. The highest value in standard deviation was noted to be 1.12, which shows that ZTBL rarely makes classification of the borrowers according to the calculated risk factors (as per assigned risk rating), indicating a weak risk management area in ZTBL.

4.6 Operational risk assessment (ORA)

ORA is an important factor in various agriculture support programs operating in ZTBL. After implementation of Basel-II in 2004 which had focus on market and operational risk along with disclosure requirements in financial institutions, all commercial banks became more attentive in ORA process in order to efficiently monitor transactional risk. Implementation of Basel-III in 2010 after the financial crises of 2008 rejuvenated regulatory focus on four key banking parameters including capital, leverage, funding and liquidity. This ORA process has played an integral role in managing operational risk. Table VIII represents the responses on the questions related to ORA. Five questions showed the mean value of 5.2, which reveals that ZTBL's management has full concentration on implementation of a proper set of guidelines and rules for effective operational risk management. This argument is supported by the overall mean value of Table VIII where no big difference is observed in all five questions regarding ORA.

The result indicates the lowest mean value of 4.96 for question 5, showing that periodic reports are regularly prepared to monitor operational risk in ZTBL. The highest mean value is 5.46 for question 2, indicating that board and executive management of the bank recognizes, understands and has well-defined categories of operational risk applicable to their institution. No significant difference is witnessed in highest and lowest mean value that shows that respondents have somewhat similar views on ORA. The lowest standard deviation value of 0.84 signifies that the data points have less variation and are closer to the mean value of 4.96. The highest standard deviation value of 1.13 indicates that ZTBL's higher management still fails to transform the strategic directions of operational risk management as given by the board. In view of results, ZTBL needs to improve ORA through technological advancement and focus on key banking considerations as

Questions	Mean	SD
For management of operational risk, proper set of guidelines and rules are in-practice in ZTBL	5.40	0.94
Board and executive management of the bank recognizes, understands and has defined all categories of operational risk applicable to their institution	5.46	0.98
Strategic directions are transformed by the higher management given by the board through the management of operational risk	5.17	1.13
Contingency and business continuity plans are there in ZTBL to ensure its ability to operate as going concern in order to minimize losses regarding event of severe business disruption	5.02	1.08
Periodic reports are regularly prepared and reviewed regarding operational risk in ZTBL	4.96	0.84
Average	5.20	

Table VIII.
Operational risk
assessment (ORA)

recommended in Basel-III. The overall findings shown in Table VIII support the theoretical conception of Bilal *et al.* (2013) who recommended more focus on ORA in order to have better compliance of regulatory requirements in domestic, foreign and Islamic banks.

4.7 Liquidity risk assessment (LRA)

Liquidity mix is one of the prime factors in determining the strength of financial institutions. In banks, the "return on deposits" is linked to the cost of capital (COC). The lower or higher level of COC decides banks' negotiation capacity to compete with its peers for available lending deals (Niinimaki, 2004; Bilal *et al.*, 2013). Table IX indicates the importance of liquidity risk in ZTBL that is facing liquidity shortage issues, which is a serious challenge in extending short-term and long-term loans to farmers. To mitigate liquidity shortage, it borrows funds from different lending agencies on higher interest rate, which resultantly increases its COC. This higher COC is carried forward to the pricing associated with the agriculture credit, and resultantly farmers have to bear a higher cost of borrowing.

A total of 11 questions were asked from the respondents with regard to LRA in ZTBL. The lowest mean value of 4.00 for question 10 indicated a low level of consensus of risk management staff on key risk investigation tools, i.e. stress testing and scenario analysis to manage liquidity in ZTBL. Question 5 indicated the highest standard deviation value of 1.24, having greatest dispersion from the mean value of 4.75. This trend indicates that ZTBL lacks flexible options to offer attractive profit rates to depositors in case of unusual liquidity pressure. It creates inability for ZTBL to divert capital from other banks in order to offer competitive deposit rates. In this case, ZTBL has the only option to borrow high cost capital from money market that subsequently increases its COC. In presence of existing unattractive liability procurement system, management of ZTBL should overcome this sensitive issue by hiring of professional liability team to procure low-cost deposits from the market. In addition, ZTBL should regularly evaluate liquidity risk in order to maintain lower COC and optimal weighted average cost of capital (WACC).

4.8 Risk management practices (RMPs)

Risk management in agricultural finance refers to the evaluation of associated risks, risk mitigation strategies, RM and transfer of risk using RMPs in an absolute or relative way.

Questions	Mean	SD
Prime determinant of the soundness of banking sector is considered liquidity in ZTBL	5.81	1.15
The "Management Board" defines liquidity risk strategy, and in particular, bank's tolerance for liquidity risk based on recommendation made by Treasury and Risk Committee	5.20	1.06
Management of ZTBL gives due consideration to external and internal factors posing liquidity risk while formulating the liquidity policy	5.03	1.02
ZTBL's policy defines general liquidity strategy (short and long term)	4.93	0.69
To deal with the unusual liquidity pressures, ZTBL uses flexible policy to procure market deposit	4.75	1.24
Board of directors and senior management closely monitor and regularly review liquidity policy in ZTBL	4.93	1.11
Asset Liability Management Committee comprises higher management from each prime area of operations in ZTBL	4.84	1.01
Asset Liability Management Committee is responsible for reviewing and recommending liquidity risk policies in ZTBL	4.99	1.06
ZTBL has identified the means and ways to meet its funding requirements	4.81	0.92
Stress testing and scenario analysis plays a central role in liquidity risk management framework of ZTBL	4.00	0.56
ZTBL applied stress test based on value at risk (VaR) technique as market risk management tool	4.27	0.73
Average	5.05	

This leads to a prudent risk evaluation process for developing a secure credit portfolio with available agriculture financing products. Despite the URM, and adoption of sophisticated risk assessment and analysis procedures, the staff of ZTBL is not fully equipped for the accurate implementation of efficient RMPs in the process of credit approval. Table X indicates the mean value of all 16 questions related to RMPs i.e. 4.65. This inclination shows that relevant risk staff in ZTBL is making effort to follow RMPs in all banking functions.

Question 16 showed the lowest mean value of 4.24, which indicates that respondents realize the need of improvement in "RMPs at ZTBL to make it more competitive in compliance of regulations. Question 2 had the highest mean value of 5.29, which signifies effective risk management as one of the most important objectives in ZTBL. Table X shows a minimal difference among the mean values of all 15 questions related to RMPs indicating somewhat identical response of participants regarding each question. Question 16 showed the lowest variation in standard deviation with the value of 0.70, which indicates that data points are closer to the mean value 4.24. On the other hand, question 6 showed the highest standard deviation by having the value of 1.28. This higher dispersion shows that risk policy of ZTBL needs revision and it should have more focus on regular and modern risk management training programs for its concerned staff in order to mitigate the current challenges in risk evaluation process.

5. Findings based on empirical analysis of theoretical framework

This paper investigated the relationship of seven important risk management factors with the RMP (H1):

(1) URM;

(2) ARA;

Questions	Mean	SD
Risk management policy of ZTBL clearly defined the roles and responsibilities of various functions of the bank	4.97	1.01
The effective risk management is one of the important objectives in ZTBL	5.29	1.16
ZTBL is highly effective in continuous review/feedback on risk management strategies and performance	4.54	0.79
Executive management of ZTBL regularly reviews bank's performance to manage its business risk	5.05	1.05
ZTBL's risk management procedures and processes are documented and provide guidance to staff about managing risks	4.72	0.98
It is policy of ZTBL to regularly conduct modern risk management training programs for all of its concerned staff	4.81	1.28
ZTBL emphasizes the recruitment of highly qualified people with relevant knowledge of risk management	4.32	0.73
Risk management policy is communicated from top to down level in ZTBL on regular basis	4.36	1.12
ZTBL has a comprehensive risk management process (including board and senior management) oversight to identify, measure, evaluate, monitor, report and control of all types of risks on time-to-time basis	4.74	1.10
ZTBL finds it too risky to invest funds in one specific sector of the economy	4.33	0.89
Risk management strategy of ZTBL is flexible enough to deal swiftly and adequately with all risks	4.87	1.01
Application of Basel-II and Basel-III Accord will improve the efficiency and risk management practices in the ZTBL	4.67	0.92
ZTBL is successfully implementing the regulatory guidelines of Basel agreements and central bank's prudential regulations with regard to risk management	4.36	1.05
ZTBL assesses the adequacy of their capital, liquidity, funding and leverage in relation to their risk profiles, market and macro-economic conditions in the country	4.55	0.97
I consider the level of risk management practices of ZTBL to be excellent	4.24	0.70
Average	4.65	

Table X.
Risk management
practices (RMPs)

(3) RI;

(4) RMR;

(5) CRA;

(6) ORA; and

(7) LRA.

Following the conception of Hassan (2009), the function of RMPs in agriculture credit is mentioned as follows:

$$\text{RMPs}: f \text{ (URM, ARA, RI, RMR, CRA, ORA, LRA, bank type)}. \tag{1}$$

The descriptive statistics used to investigate Equation (1) have been presented in Tables III–X. The results indicate that all predictors have positive relationship with RMPs at ZTBL. However, descriptive facts revealed important insights, which might contribute to minimize the high delinquency ratio caused by increasing nonperforming loans in agriculture credit as indicated by the statistics of agricultural finance, issued by Central Bank of Pakistan (SBP, 2017).

The first hypothesis proposed that risk evaluation practices, i.e. URM, ARA, RI, RMR, CRA, ORA and LRA have significant relationships with RMPs in specialized agriculture financial institution. Our findings confirmed this hypothesis by verifying the positive association of all risk evaluation practices with the effective RMP in ZTBL. However, some of the points revealed higher dispersion, signaling important implications for effective administration of risk evaluation procedures. Such as, in Table IV, a higher dispersion for question 7 suggests the need for improvement in the risk ordering process, while the resource constraints should be properly addressed for handling of associated risks. Thus, the character-specific, business-specific, cash-flows-specific and industry-specific risks should be rated independently for the calculation of risk ratings (Dadzie and Acquah, 2012). Furthermore, a higher variation was found in question 6 (Table V) regarding the RI process at ZTBL, indicating the inadequate compliance with the internal and external credit policy guidelines. The recommended application procedure for the systematic identification of risk was not up to satisfaction. Hence, in order to ensure effective risk management, RI process should be improved (Hassan, 2009; Rehman, 2016) and policy guidelines should be properly followed (Aimin, 2010) for compliance of short-term and long-term agriculture credit. The outcome of RMR showed a higher dispersion in question 1 (Table VI) revealing that despite of higher importance, the ERM is not widely considered as an important function of RMPs by the staff of ZTBL. Based on this finding, it is suggested that ERM should be an integral part of credit policy manual as suggested by Al-Tamimi and Al-Mazrooei (2007), and its guidelines should be strictly followed in agriculture credit evaluation process (Hussain and Thapa, 2012).

A gap in the classification of borrowers was revealed at ZTBL during CRA, where borrowers are not properly organized according to the given risk factors (Table VII). We argue that immediate attention should be given by the ZTBL's internal policy makers to ensure effective compliance. Our finding suggests that more attention should be given toward transformation of strategic directions as per guidance of the board in ORA. The results in Table VIII support theoretical conception of Bilal *et al.* (2013) who suggest higher attention in ORA for better regulatory compliance of Basel guidelines. More specifically, following the policy direction in Basel-III, four important banking parameters should be considered by ZTBL policy makers including adequacy in the leverage, capital, funding and liquidity of the bank as per targeted ratios given in Basel agreement. If ZTBL fails to follow these regulations, it might face complications in meeting obligatory

requirements by the bank's capital adequacy, depositor/investors' expectations of higher returns and optimal pricing of credit products to the farmers.

In the results of LRA (Table XI), question 5 revealed a higher variation from the mean value. Thereby, it signifies "higher liquidity constraints" as the most important issue in ZTBL. To mitigate shortage of liquidity, management have to borrow high cost funds from the money market or special saving accounts. This fact is also evident from current deposit mix of ZTBL as shown in its annual financial reports. The audited figures of FY 2016 showed a high cost "term deposit" that has increased to 64 percent of total deposit from FY 2015 where it was merely 39 percent. The "saving deposit" has marginally reduced to 15 percent (FY 2016) against 24 percent (FY 2015). On the other hand, the main contributor of low-cost deposit, i.e. zero cost "current deposit" substantially reduced to 21 percent (FY 2016) against 37 percent in (FY 2015). Resultantly, current deposit mix has increased ZTBL's WACC, which is ultimately shifted on ZTBL's financing products and has to bear by farmers as "higher cost of debt." This higher cost of capital particularly reduces ZTBL's ability to offer competitive pricing to corporate agricultural borrowers who are easily attracted by the other low cost commercial banks. Moreover, it has reduced the pricing spread that is evident from consecutive reduction in net profit after tax in audited financials of ZTBL from FY 2015 to FY 2017. Based on these findings, it is recommended for ZTBL's policy makers to develop more flexible options for the low-cost depositors in order to offer them attractive and bankable packages including free operational services like cheque books, pay orders, banker's drafts, ATM, locker facilities, etc., so that they can attract and retain their low-cost deposits at ZTBL.

The most important issue highlighted in RMPs at ZTBL was lack of focus on regular training programs for all concerned risk staff to improve their capabilities for better regulatory compliance. We suggest that ZTBL should administer regular training program with specific emphasis on credit screening through five credits Cs, i.e. character, capital, creditworthiness, cash flows and collateral against farm credit. Further training programs should be comprised of advance courses including handling of systematic and unsystematic risks. Farmers' awareness sessions should also be arranged by credit officers regarding

Research hypothesis	Result	Conclusion
H1: risk evaluation practices, i.e. URM, ARA, RI, RMR, CRA, ORA and LRA have significant relationships with RMPs in ZTBL	Accepted	Though mean values of all six predictors for RMPs reveal variation but in consolidation, positive relationship is traced among URM, ARA, RI, RMR, CRA, ORA, LRA and RMPs in ZTBL
H2: review of RMPs has a consequential influence on potential RM policies in ZTBL	Accepted	During review of ZTBL's risk evaluation process, acceptable average mean values of URM (4.74), ARA (4.68), RI (4.49), RMR (4.85), CRA (5.41), ORA (5.20), LRA (5.05) and RMPs (4.65) were obtained. Based on this, the consequential influence of risk evaluation factors i.e. URM, ARA, RI, LRA, ORA and RMR is traced with RMPs and its instigated RM policies in the short-term and long-term agriculture products in ZTBL
H3: ZTBL has adequate regulatory compliance and follows Basel-III standards that have subsequent effect on reframing RMPs	Partially accepted	In response to our questions on implementation of regulatory guidelines and Basel obligations in ZTBL, partially supports *H3* as mean values of responses are not viewed strong with regard to ZTBL's policy manuals. In line with results, we recommend to the management of ZTBL for implementation of "facility risk rating (FRR) score card" for all short-term and long-term financial facilities and ensure regulatory compliance by the risk reviewers. In addition, approval of risk for agriculture facilities and its pricing should be in accordance with assigned FRR facility rating scores

Table XI.
Responses of study hypotheses

technological innovation in cultivation and livestock up-gradation to gain maximum yields. Marketing staff should do field surveys for identification of real agriculture borrowers and the purposeful utilization of financing for agriculture needs only. We find another important post-risk evaluation credit "C", in agriculture financing i.e. "covenant" (covenants against approved credit) that must be taken into consideration in all risk approvals in accordance to the retrieved credit scores from "facility risk rating (FRR) score card." Thus, we propose transformation of agriculture risk review process through six pre-and-post-risk evaluation credit Cs rather than reliance on the five conventional credits Cs. Through our proposed "post-risk evaluation" credit C, we recommend to evaluate facility-wise farm credit, rather to evaluate the customer on composite risk scoring. Each short-term credits (running finance, cash finance, import, post import, export-related facilities), and long-term agriculture credits have unique characteristics and inherent risks. Thus, in ZTBL, each facility is recommended to evaluate independently. As per evaluated risk scores, said facility should be enclosed with "specific covenants," rather to impose combined covenants on overall farm credits. All the above-mentioned results substantiate *H1*, and a positive relationship is found among URM, ARA, RI, RMR, CRA, ORA, LRA and RMPs in ZTBL.

H2 postulates that review of RMPs has a consequential influence on potential RM policies in specialized agricultural financial institution. The consolidated mean values of predictors (Tables III–X) show that URM, ARA, RI, RMR, CRA, LRA and RMPs have acceptable average values. Thus, it is inferred that review of RMPs through our proposed risk factors has significant influence on potential RM policies for short-term and long-term agriculture credits. This offers significant implications for ZTBL management to use all risk filters for prudent screening and monitoring of product-specific risk, hence, *H2* is fully supported. Our result validates the findings of previous studies that deem a clear URM, proper assessment and analysis, prudent RI, RMR, careful credit, LRA and ORA as prime elements of effective RMPs in Islamic banking (Hassan, 2009; Rosman, 2009), as well as in local commercial and foreign banks (Bilal *et al.*, 2013; Shafiq and Nasir, 2009).

In *H3*, it is hypothesized that ZTBL is adequately adopting regulatory compliance and Basel-III standards that has subsequent effect on reframing of RMPs. In post-financial crises of 2008, Basel-II did not have any explicit regulation on credit risk, which can be followed by the banks to take it on their books, rather it was focused on individual financial institutions, while ignoring systemic risk. To overcome the regulatory gaps of insufficient assessment of systematic risk and lack of focus on individual financial institutions, in 2010, Basel-III was introduced. This regulation concentrates on the following points: fixation of common equity to 4.5 percent and Tier-I capital to 6 percent; it proposes that the leverage ratio (Tier-I capital/bank's average total consolidated assets) should be greater than 3 percent; it focuses on the prevention of "Bank Run," with minimum liquidity coverage ratio limit of 100 percent by January 2019; and introduction of counterparty credit risk that outlines capital requirements to manage higher capital needs for securitization of products and credit value adjustment risk.

In order to affirm *H3*, the responses of questions 12, 13 and 14 from Table X were evaluated. The findings revealed comparatively lower mean values of all three questions that imply an inadequate application of Basel-II and Basel-III and subsequent lower efficiency in RMPs at ZTBL. ZTBL is not that much successful in implementing the regulatory guidelines of Basel agreements and central bank's prudential regulations with regard to risk management. Moreover, ZTBL is partially meeting all four obligatory requirements of Basel-III, and its assessment for the adequacy of capital, liquidity, funding and leverage in relation to the risk profiles, market and macro-economic conditions in the country to be somewhat acceptable.

Though our result supports *H3* to some extent, the mean values do not reveal strong feedback of respondents with regard to bank's regulatory policy manuals. In line with the findings, it is recommended to the management of ZTBL to implement an "FRR score card"

that is a standardized tool for reviewing specific short-term and long-term credit facilities to ensure its compliance by risk reviewers for all types of agriculture financing products. In addition, the pricing of individual credit product should be in accordance to the assigned FRR as per FRR score card. Our result supports the finding of Bilal *et al.* (2013) and Featherstone *et al.* (2006) who argued that probability of default can be managed through proper assignment of risks with individual credit facilities. They further emphasized the treatment of credit facilities and its pricing as per retrieved risk rating for acceptance or rejection of risk.

It is concluded that policy makers at ZTBL have incorporated most of the internal policies, regulatory obligations and international guidelines in bank operating policy manuals to manage internal and external risks; however, due to weak training programs, improper coordination amongst front and back office risk functions and use of conventional mode of banking with inadequate technological automation, ZTBL is facing risk compliance issues. These issues are consequently affecting the health of agriculture-related assets and liabilities. Most of the respondents appear to support beliefs in "one-size-fits-all" strategy for improvements in risk management structure but ZTBL system needs improvement to support vibrant risk policies. Based on our results as shown in Table XII, we recommend regular training to the bank staff for the risk compliance process as well as system automation with modern information technology software and advance hardware to support real-time online system. These improvements would have direct influence on the bank's liquidity and credit risks, since real-time online banking system invigorates customer's trust on banking services, particularly farmers. These findings are also supported by the extant research studies that deem on-time payment realization against commodity supplies, which is an important function in credit risk management (Ayaz and Hussain, 2011; Velandia *et al.*, 2009). The respondents substantiate that key banking risks are related to operations, liquidity, credit, compliance and regulation, reputation, interest rate, repayment, settlement, law and technology, which are currently managed through interrelated RMPs in risk evaluation process at ZTBL. Nonetheless, the result pattern in our analysis indicates that still there is a need to improve risk management infrastructure in ZTBL. This would be used as a shield to avoid nonperforming assets and improve delinquency ratio.

6. Conclusions and recommendation
This study enhances our understanding that ZTBL, being a specialized financial institution for agricultural credit, is playing an important role in agrarian economy of Pakistan to meet the farmers' short-term and long-term investment and financing needs. Our empirical findings conclude that despite of government ownership and liquidity support, the risk evaluation process at ZTBL is not fully compatible to the standard regulatory compliance, hence there is a need for fundamental reforms in its policy manuals to be in line with the central bank's

S. No.	Risks	Degree of acceptance
1	Operational risk	0.75
2	Liquidity risk	0.71
3	Credit risk	0.79
4	Compliance and regulatory risk	0.72
5	Reputational risk	0.60
6	Interest rate risk	0.66
7	Repayment risk	0.62
8	Settlement risk	0.59
9	Legal risk	0.71
10	Technology risk	0.91

Table XII.
Description for degree of risk acceptance in ZTBL staff

agriculture prudential regulations and Basel-III standards. Though our first two hypotheses are substantiated and third is partially supported, the results have indicated notable issues in risk evaluation processes at ZTBL. Based on these issues, we recommend following improvements in the RM review system for agriculture financing products at ZTBL:

- The analytical and statistical analyses and risk evaluation should be conducted through advanced score card software. The individual-level, firm-level, sector-level and country-level risk determinants should be taken into account that enable risk reviewers to take prudent investment decision.

- The investment and financing needs of the farmers, SMEs and corporate agriculture customers should be assessed as per respective prudential regulations. The review of risk should be conducted for all types of credits; each financial facility should be independently evaluated through "FRR score card" for acceptance or rejection of proposed credit facilities.

- Instead of standard pricing for all financing products, each credit facility should be priced in accordance to the given risk rating in FRR score card that may be varied due to unsystematic risks.

- All farm credit proposals should be filtered through six credit Cs along with enclosure of integral "credit covenants" for respective facility.

- The front desk officers in ZTBL should have adequate knowledge in agriculture and livestock businesses in order to evaluate and assess actual financing needs of the farmers. Moreover, they should be capable to guide farmers about procedural documentation of the collateral for convenient disbursement of facilities.

- For agriculture credit decisions, the credit risk committee should include members from front desk relationship managers to analyze MR, crop or livestock experts to analyze real working capital needs, risk analysts and regulatory compliance officers to evaluate credit risk, regulatory and compliance risk, interest rate risk, repayment risk, legal risk, settlement risk, etc.

- As per feedback from respondents, a "one-size-fit-all" package should be offered to the farmers to meet their specialized agriculture and commercial banking needs on real-time online banking system under one roof. This offer will sustain farmers' relationship with ZTBL as a sole financial service provider for all of their farm-related banking needs.

- Though the current policy manuals of ZTBL are integrated with the central bank's prudential regulations for agriculture finance and Basel-III regulatory compliance for management of assets and liabilities, however bank's policy guideline lacks their full compliance in operational and financial decision making. Employees' weak training infrastructure, non-availability of advance software and its supportive hardware, along with weak post-approval RM system causes the poor compliance of standards at ZTBL that needs further improvement.

- In present scenario, bank's liquidity mainly relies on government funds, external high cost deposits and expensive money market borrowings. ZTBL management should offer flexible deposit options to attract low-cost deposits from the farmers and general public. This would improvise the bank's ability to negotiate credit pricing at competitive offers alike peer banks.

- It is strongly recommended that ZTBL should transform existing RM framework with efficient risk review system to offer better facilities to its customers for building competitive position in the market.

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