International Journal of Business Marketing and Management (IJBMM)
Volume 3 Issue 7 July 2018, P.P. 01-30
ISSN: 2456-4559
www.ijbmm.com

Impact of Institutional Credit on Agriculture Production in Pakistan

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ABSTRACT*: Our research is intended to investigate the impact of institutional credit on agriculture production in Pakistan. It is a time series analysis. We took the data of ten years. It included the total bank lending during last ten years from 2003 to 2013. Agriculture production was estimated using three major crops named as wheat, rice and cotton. As these three crops majorly contribute to the production segment of agriculture so research findings tend to represent the actual population. Development segment included livestock, tube wells and tractors. Livestock contributes 51% to total agriculture value addition. Bank lending included the total disbursements by all the banks in Pakistan to the agriculture sector of Pakistan. We concluded our work in three parts. In the first part of analysis we acknowledged the impact of production loans on agriculture production segment by taking three variables of production known as seeds, fertilizers and cultivated area. We used correlation to identify relationship between credit and agriculture inputs. Then we used regression analysis to check the dependability of production on these input factors. Two different types of analytical tools were used as credit indirectly impacts production through inputs. The second part was about the usefulness of development loans. Here we used regression analysis to unveil the relationship between development loan and indicators of this segment. Lastly, we considered the performance of banking sector in terms of their targets set by SBP, relevant disbursements and recoveries there against. Data analyses in the first part indicate that there is a significant positive relationship between agriculture production and production loans. This relationship is significant because 85-90% agriculture bank lending pertain to production loans. As bank is mainly lending to this sector and results are in the form of increased productivity. Results in the second part of study have not been reported as positive. Relationship between development loan and tube wells and livestock production is found insignificant. The reason behind this is very small sum invested in these segments of the agriculture sector. However, relationship was significant between development loan and number of tractors. But co efficient of determination represents lesser dependability of tractor population on development loans. So, we concluded that development loans are not playing significant role in development segment of agriculture sector. However, banks performance has been reported satisfactory as analyzed in terms of targets set by SBP. Most of the banks disbursed more than their annual targets. Empirical data analysis indicates consistent recovery rate against the disbursements by the banks.*

Key terms*: institutional credit, bank lending, Agriculture production, Livestock, disbursement of funds, Agriculture Development Loans, Production Loans.*

I. Introduction

1.1Agriculture Sector

Pakistan is known to be agriculture nation but its contribution towards to economic development is going to decrease on constant basis. Gross domestic production (GDP) contribution of agriculture sector is going to fall to 20.9% in 2011 as compare to 21.3% in 2010. Agriculture has remained the mainstay in Pakistan economy with content of employment because still it's provide major 45% employment opportunities to the population but its contribution decreased from 47% in 2010 to 45% in 2010. (GOP, 2010-11) Agriculture sector is not only source of food and fiber of 190 million people of Pakistan but it also supplies raw material and labor force to manufacturing and service industry and contribute 60% to foreign exchange earnings and it is the largest market for industrial sector such as

- Fertilizers
- Pesticides
- Tractors and agriculture implementation

GDP contribution of service and industrial sector as compare to agriculture sector shows a positive trend as 53.3% and 25.8% respectively. Agriculture sector shows a negative growth trend and its growth slowdown to 2.7% in the decade of 2000 as compare to 5.4% in the decade of 1990 and this negative growth remain upward till now. Over the last seven years, agriculture sector presented a growth at an average rate of 3.7% per annum. Growth volatility in this sector is very high as agriculture sector presented a 6.3% growth in 2005-06 and on the other hand 1.0% in 2007-08 because of fluctuation in productivity of major crops.

Pakistan is an agriculture base country and bless with expanded and varied weather condition, soil, largest irrigation system and huge man power that do provide competitive advantage to Pakistan. With content of agriculture production, consumption, exports and quality of products, Pakistan is far behind from international quality and market standards.

Pakistan agriculture sector face a lot of problems in the manner of development and growth such as lack of modern technology (tractors, bowing and harvesting machine), crops management technique, standards of agriculture inputs, on time water and inputs availability, raising production cost by increasing prices of inputs and volatility in supply of credit.

Most of farmer of Pakistan have subsistence farm holding and doesn't have ability to use high quality of seeds, fertilizers, pesticides and innovative technology due to lack of funds. This is the main reason of backwardness of agriculture sector which can be sort out by providing sufficient funds through financial institutions.

1.2 Institutional Credit

Every business requires sufficient credit to run is operation on competitive level either from their own resources or from borrowed money, so same condition applied in agriculture sector. Agriculture sector is the backbone of our economic structure but it doesn't operate up to international standards and main reason of this backwardness is lack of sufficient funds. Agriculture credit plays a significant role in increasing crops production, efficient and effective use of agriculture resources.

Like other developing countries, Pakistan agriculture credit market based on formal and informal source of lending. Under informal source of lending, farmers obtained funds from lenders, commission agents and money brokers in village and surrounding areas including friends and relatives.

The second source of lending is formal pattern which is also known as institutional lending. There are two specialized banks regarding agriculture lending by following, Zari Taraqiati Bank Limited (ZTBL) and Punjab provisional cooperative bank limited (PPCBL). There are also fourteen domestic private banks that are reasonably contributed towards the agriculture production and development. Askari bank limited and bank al-habib limited are the major shareholders as compare to other banks. (SBP, 2010-11).

On period basis, agriculture credit is classified into three main categories which are follow,

- Short term loan
- Medium term loan
- Long term loan

Short term loans within 1 year) are given by financial institutions to purchase seeds, fertilizers, pesticides and other inputs as well as for marketing the crops. Medium term loans (1 to 5 years) years are given by institutions to purchase farms implements, leveling of land and for the establishment of agro base industries. Long term loans are being provided by the formal institutions to purchase the machinery and development of tube wells etc.

Currently all the financial institutions formulate and development their agriculture lending portfolio on two basis which are as follow,

- Production loans
- Development loans

1.3 Statement of Problem

There are different determinants of agriculture production. These factors cover cultivated area, offtake seeds, offtake fertilizers, production and yield. With the help of these factors we will ascertain the performance of different crops in terms of productivity. Agricultural lending can be formal or informal; however, we will discuss only formal (institutional) lending for our dissertation purpose.

After this we will discuss the lending pattern of financial institutions towards the agriculture sector in terms of production and development loans. Then we will correlate the variables of agriculture production with institutional credit to analyze the impact of institutional credit on agriculture production in context of Pakistan.

We will also discuss the performance of financial institutions with reference to this sector in terms of their credit targets, achievements of these targets and non-performing loans. Lastly, we will discuss different types of agriculture borrowers in respect of their land holdings (subsistence holding, economic and above economic holdings) and proportionate lending's of financial institutions to these different types of borrowers.

1.4 Significance of Study

The following points expound the importance of this study which are as follow,

- The study will help us to understand the importance of institutional credit in agriculture sector of Pakistan by ensuing the agriculture inputs, technical changes and technical efficiency.
- This study will help us to understand that to what extent institutional credit sufficiently meet the needs of agriculture sector of Pakistan.
- This study will provide a base line for upcoming studies and field works related to impact of institutional credit on agriculture productivity in Pakistan.
- The selection of this study will assist in finding ways and horizons through which institutional credit can effectively use in agriculture sector, to enable growth in economy (Pakistan).

1.5 Objective of study

Agriculture sector is backbone of our economy by employing labor more than any other sector and significantly contributes to Gross domestic product (GDP) of our country. Agriculture credit provided by financial institutions is a critical factor for the growth of agriculture sector. The theme of the study is to investigate and analyze the impact of institutional lending in this imperative sector.

The aim of this research is to study the relationship between institutional credit (Independent variable) and agriculture production (Dependent variable). We shall also consider the impact of some other variable on above mentioned relationship to justify the research finding. The objective of this study is also find out what kind of relationship exists between Institutional credit and agriculture growth determinants (Cultivated land, seeds availability, off-take fertilizer, production and yield of different selected crops) and what are the consequences that come out by fluctuating in these determinants.

To expand and comprehend this study we will also consider the performance of banking sector in terms of their targets, actual disbursement and non-performing loans in agriculture sector. All these objectives can be summarized as follows,

- To analyze the scope of agriculture sector in overall economy of Pakistan
- To analyze the contribution of institutional credit in agriculture productivity with respect to Pakistan
- To see the impact of institutional credit on agriculture inputs, technical changes and technical efficiency
- To analyze the performance of financial institutions in agriculture sector by considering their targets, actual disbursement and non-performing loans
- To analyze the different ways to grow the agriculture sector by following efficient allocation of funds

II. Literature Review

(Iqbal, Ahmad, & Abbas, 2003) also stated that agriculture sector is one of the largest sector of Pakistan economy and Pakistan recognize as agriculture nation as well as agriculture sector mostly contributed towards the GDP, foreign exchange earnings and livelihood so it's the chief responsibility of our government to invest more and more capital in this primary sector of economy.

(S.S.Jaffar, K.Javed, &T.E.Lodhi, 2006) conducted a research study on "An evaluation of micro credit schemes of small and medium enterprise development authority (SMEDA)". They started their study by defining the influential role of micro credit schemes in the development and growth of agriculture sector Pakistan. To achieve the significant level of findings, research tried to find out the result with the help of case studies conducted on the respondents of Small and medium enterprises authority (SMEDA) and Bank of Punjab (BOP).

(S.S.Jaffar, K.Javed, &T.E.Lodhi, 2006) research work based on primary sources so researchers were chosen the two union councils of SheikhpuraofPunjab province as a sample with the alliance of bank of Punjab (BOP) Kotabdulmalik branch. For the purpose of research, authors directly interviewed 120 respondents from both

union councils of Sheikhpura to get the information regarding the structural facilities of farm credit and the range of impact of such credit on the productivity of agriculture crops.
(Abedullah, kousar, mushtaq, &mazhar, 2006) conducted a research study on "The role of credit to enhance cotton production in Punjab province of Pakistan". The core purpose of this paper is to analyze the impact of institutional credit on cotton production andalso consider a relationship among agriculture credit, cotton production and technical advancement in this sector.
(Shahidur.R.Khandker&Rashdur.R.Farquee, 2007) study indicate that 76% of the farmers get the farm credit through financial institutions, 13% respondents have access to money landers, commission agents and relatives and rest of the farmers doesn't have any type of credit facilities. At the end, this study also indicate that micro credit schemes play a positive role in the development of agriculture sector by defining that 39% of the respondents have interest free loan, 21% have credit without personal obligation and rest of the respondent have credit facility on easy terms.
(Shahidur.R.Khandker&Rashdur.R.Farquee, 2007) conducted a study which contained 120 farmers growing rice as a sample. These farmers obtained credit from two banks named as Rajshahi Krishi Unnayan Bank (RKUB) and Grameen Bank (GB). Researchers also included 60 other people in study who were rice growers but obtained credit from nowhere. The data was collected from both banks and AEO offices for this study. They used Cobb-Douglas function model for data analysis. They also conducted efficiency analysis which revealed that resources and inputs were not utilized effectively in the case both credit users and non-users. Either these were underutilized or over utilized.
(Jehan& Muhammad, 2008) concluded that credit have major impact on the sugarcane productivity commercial banks on the whole does well in serving the agriculture sector through the medium of agriculture credit disbursement schemes. They also make some recommendations to make improvements in the productivity of sugarcane by disbursing the loan.
(Saleem, 2009) conducted study "The Impact of Institutional Credit on Agricultural Productivity in Dera Ismail Khan". He has discussed the usefulness of credit availability to agriculture sector. The objective of the study was to investigate food requirements and the impact of initiation of technology in this sector. Credit has been observed as main cause of technological advancements. He has developed the relationship between credit and agricultural gross domestic product.
(Ikram, 2009) said that area under cultivation is reducing at fast pace. Agriculture land is being converted into residential colonies. He also discussed other factors due to which production level is low in developing countries. These include obsolete cultivation techniques, small land holdings, lack of research and technology and subsistence farming.
(Ayaz, Hussain, & Sail, 2010) had written an article on the topic "Impact of institutional credit on production efficiency of farming sector" with reference to Faisalabad. This case study describes and point out the level of crops production efficiency of agriculture sector particularly in context of Faisalabad district. They started their case study by defining the importance of agriculture credit in crops production and the foremost reasons of backwardness of our agriculture sector as compared to develop economies.
(Ayaz, Hussain, & Sail, 2010) conducted a research work on "The role of credit on production efficiency of farming sector in Pakistan". The main and core objective of this study was to analyze the reasons of agriculture sector inefficiency, both in production and development segments with reference to Faisalabad district of Punjab province. They started their discussion by defining the importance of agriculture sector with context to gross domestic product, labor force and export contribution to the development of nation.
(Sail, sarwar, Awan, & Waqas, 2011)conducted a research study on "The role of institutional credit on agriculture in Pakistan" through the time series analysis from 1972 to 2008. They started their discussion by defining the importance of credit in agriculture sector that the credit is the foremost and significant solution in implementing advance technology, achieve the international standard of technical efficiency and purchase the quality farm inputs (Seeds, fertilizers and pesticides) to meet the standardize level of agriculture production.
(Ugbem&Ekpebu, 2011) conducted a research work to analyze the "Determinants of formal agricultural credit allocation to the farm sector by arable crop farmers in Benue State, Nigeria". The core and main objective of this study is to analyze the impact of social and economic condition on the credit allocation to the farmers in Nigeria. To achieve the maximum objective of this study, researchers used the primary and secondary data collection along with the support of regression analysis method.

2.2 Hypothesis

Hypothesis describes the estimated relationship between institutional credit (Independent variable) and agriculture production in the form of a testable statement. Hypothesis is used to develop to justify the statement in a favorable or contradiction manner. To find out the solution of our problem and achieve the objective of research work, we have established the following hypothesis.
H1: Institutional production loan is effectively contributing in agricultural growth of Pakistan.

Production loans are given to purchase agriculture inputs including seeds, fertilizers and pesticides. To analyze the effectiveness of this credit in agriculture production, we will conduct a time series analysis of production loans disbursed during last 10 years. About 92 to 94% of total agriculture portfolio is being served as production loans. Crop yield heavily depends on the quality of inputs being utilized. As discussed earlier that there is major portion of subsistence farming in agriculture of Pakistan, so credit has a profound effect on overall productivity.
H2: Institutional development loan is helpful in agricultural growth of Pakistan.
Development loan also play a significant role in agriculture production and are classified into two main categories which are as followed;

- Farm credit
- Non-farm credit

Farm credit is for the purchase of agricultural machinery ( ) and the installation of tube wells. Among total machinery we will discuss tractor loans only. Non-farm credit covers the live stocks, dairy poultry, fisheries and forestry. During twenty centuries investment in agriculture development sector was minor but now its show positive growth during last decade but still its portion in total agriculture loan portfolio is not reasonable. To analyze the effectiveness of this credit in agriculture development, we will conduct a time series analysis of development loans disbursed during last six years.
According to target monitoring and data compilation unit of state bank of Pakistan, development loan contributes only 6% in total portfolio. Low standard of agriculture infrastructure can be grow and enhance only by investing more and more in development sector of agriculture sector.
H3: Financial institutions perform significantly in terms of agriculture lending.
To promote and enhance the scope of agriculture sector in term of production and yield, financial institution plays a vital role in this sector. Agriculture credit advisory committee (ACAC) of state bank of Pakistan define the rules and regulations and requirements of credit for agriculture sector and the limit of credit for specific fiscal year will be approve by national credit consultative council (NCCC).
To analyze the performance of financial institutions with respect to agriculture lending, we will conduct the time series analysis by viewing following points.

- Target limit for every bank given by agriculture credit advisory committee
- Make comparison between credit target limit and actual credit disbursement
- Make the relationship between disbursed loan and non-performing loan

By analyzing the above points, we will conclude the extent to which financial institution perform in terms of production and development of agriculture sector.

III. Methodology

3.1 Research design

Our study can be called descriptive in nature because we tried to ascertain the agriculture credit in terms of bank targets, actual disbursements and non-performing loans. We assessed the agriculture production and explained different variables pertaining to production.
Hypothesis testing is also an integral part our study. This is supposed to develop a relationship between institutional credit and agriculture production. Institutional credit is treated as independent variable whereas agriculture production as a dependent variable.

3.2 Population of the Study

Our population of study consists of two sets.

- Agriculture Sector of Pakistan
- Banks Lending to Agriculture Sector

3.3 Sample of the Study

Agriculture sector consists of crops, livestock, fruits, fisheries and forestry. But our sample of study includes crops and livestock. Among crops we have taken wheat, rice and cotton. Livestock includes milk, beef, mutton, poultry meat, wool hair, bones, fat, blood, eggs and skins. Fruits, fisheries and forestry are not considered because their contribution to the total output of the sector is not that much significant and lending to these segments is also very minute proportion of total credit portfolio in agriculture sector.

3.4 Research Approach Used in this Study

For the purpose of research, two types of approaches are widely used which are as follows,

- Quantitative approach
- Qualitative approach

The researchers use either one of them or both together according to their requirement to accomplish the desired goal. We used quantitative research method to perform our research work to meet the desire objective and

conclude the best opportunities to make improvement in correspondent research work.We used quantitative method because this research is about investigating the impact of institutional credit on agriculture production by considering some factors like cultivated era, seeds availability, off-take fertilizer/pesticides, and production of specific crops and credit disbursement with respect of above segments. To explore the scope and importance of this study in detail, we used the information that exists in the form of literatures, scientific articles and discussions on this topic.

Beside this, we used records in archive that are published by state bank of Pakistan, specialized, public and private banks, Federal bureau of statistics, Pakistan agriculture research council, kisan board Pakistan, Indus river system authority, Ministry of livestock and dairy development, Ministry of food and agriculture, National fertilizer development Centre, Pakistan meteorological department, Pakistan oilseed development board and other international organizations.

3.5 Data collection Sources used in this Research

Data collection sources play a significant role in research work. For the purpose of research, data can be obtained from two main sources which are as follows,

- Primary sources
- Secondary sources

Primary data refer to obtain the information directly from the target person on the variable/s of interest for the specific objective of research work. Primary data collection methods include interviews, questionnaires, observation and motivate the target and focus group. Secondary data refer to obtain the information from sources already existing. Literature review, company records, archives, government publications, websites and internet are the example of secondary sources.

3.5.1 Secondary Data Sources

We employed the secondary data source for this study to get desired goal with in-depth analysis of our selected factors as described above. Secondary data can be defined as "Information that has been gathered by researchers and recorded in books, articles, and other publications". Secondary data is very useful for research with its significant advantages: time saving and rapid accessibility.

This, however, depends on if the data is already collected and published or internally exists and also on the cost. It could also be freely available at different sources with detailed information. To avail these significant advantages of secondary data, we used this data collection source which enabled us to meet our objectives to conduct this research within given time frame.

We fully emphasized on this data collection source for this research study keeping in mind the usefulness of secondary data and its timely availability. According to Stewart and Kamis (1993), the use of secondary source has a significant advantage of less cost over primary data source. Moreover, this source also helped us to make comparative analysis between new and old data.

3.5.2 Major Secondary Data Collection Sources

We collected the secondary data and valuable information from the reports issued by following departments of government of Pakistan and some International organizations for this research work.

- State bank of Pakistan
  - (www.sbp.org.pk)
  - (Agriculture credit department and credit advisory committee)
  - (Agriculture credit consultative council)
- Zaraitaraqiati bank limited
  - (www.ztbl.com.pk)
- Punjab provisional cooperative bank limited
  - (www.ppcbl.com.pk)
- Federal bureau of statistics
  - (www.statpak.gov.pk)
- Pakistan agriculture research council
  - (www.parc.gov.pk)
- Kisan board Pakistan
  - (www.kisanrisala.com)
- Indus river system authority Pakistan
  - (www.irsa.gov.pk)
- Ministry of livestock and dairy development
  - (www.iddb.org.pk)

- Ministry of food and agriculture
  - (www.minfa.gov.pk)
- Ministry of finance
  - (www.finance.gov.pk)
- National fertilizer development Centre
  - (www.nfdc.gov.pk)
- Pakistan meteorological development
  - (www.pmd.gov.pk)
- Pakistan oilseed development board
  - (www.olivwoilpakistan.com)
- World Bank
  - (www.worldbank.org)
- Asian development bank
  - (www.adb.org)
- Punjab university new campus Lahore library
  - (www.pulibrary.edu.pk)

- Wikipedia
  - (www.wikipedia.org)

IV. Analysis of Data

Our study is aimed at to identify the impact of bank lending on the agriculture production in Pakistan. We have gathered the data on crop production in Pakistan with respect to production loans. For this purpose, we have selected three crops; wheat, rice and cotton. For analyzing the impact of development loan, we will see the population of livestock and number of tractors and tube wells in the country whereas production of crops will be analyzed against production loan.

For analysis of crops versus production loan we will use an indirect approach. First, we will discuss the relationship between credit and determinants of crop production. For this purpose, we will use correlation analysis. Later we will check whether we have taken actual determinants of crop production or not. This will be done by using regression analysis between these determinants (seeds, fertilizers and cultivated area) and crop production in different years.

In the second part of analysis we will use a direct approach. Here we will ascertain the relationship between development loan and respective agriculture development. Here regression model will be applied to check the dependability of development sector and loans disbursed to this sector.

In the third portion of data analysis we will see the performance of banking sector. It is done with the objective to ascertain that whether the banking sector of Pakistan is taking any significant part in agriculture development of the country. Performance will be analyzed in terms of bank targets, disbursement and recoveries.

Finally, we will discuss different policies adopted and development initiative taken by different financials institution in context of agriculture lending.

4.2 Production Growth in Agriculture Sector and its Respective Loan

Production loans are given to purchase agriculture inputs including seeds, fertilizers and pesticides. To analyze the effectiveness of this credit in agriculture production, we will conduct a time series analysis of production loans disbursed during last ten years. About 92 to 94% of total agriculture portfolio is being served as production loans. Crop yield heavily depends on the quality of inputs being utilized.

Production growth in agriculture sector refers to increase the productivity of major as well as minor crops. Productivity also depends on the quality of the different crops. Production segment of agriculture sector plays a vital role in overall growth in agriculture sector. As discussed earlier that there is major portion of subsistence farming in agriculture of Pakistan, so credit has a profound effect on overall productivity.

Federal seeds certification and registration department is involved to provide seeds certificates to both public and private seeds producing companies of Pakistan along with its 28 testing laboratories. In 2010-11, federal seeds certification and registration department registered 66 new companies and now 729 seeds registration companies are working for the quality of seeds to make improvement in production. There are four public and five international companies are being involved in improvement of quality of seeds program.

Fertilizer is one of the most important ingredients in the growing process of healthy crops. Awareness campaigns were launch in July 2006 through the electronic media to reach the farming and rural communities regarding the importance of fertilizer in the growth process of crops. In Pakistan, fertilizer is available in two forms like local and imported crop. In 2006-07, the quantity of local fertilizer is being improved by the 4 percent

and quantity of import crop are being decreases by the 51%, so the availability of total fertilizer was being reduced by the 34% as compared to last year.

The trend of availability of fertilizer was almost same from 2007 to 2009 and then in 2010-11, local availability of fertilizer was increased by 2.7% but on the other hand imported fertilizer was being decreased by 50% and the overall availability of fertilizer was also decreased round about 1.5% as compared to last year which massively affect the production of crops.

To analyze the impact of agriculture loan on the production segment of agriculture sector, we are going to take three crops (Wheat, Rice and Cotton) as a sample of study. As hypothesis is

H1: Institutional production loan is effectively contributing in agricultural growth of Pakistan.

H0: Institutional production loan is not effectively contributing in agricultural growth of Pakistan.

This is the first and foremost hypothesis of our study. This will majorly affect and explain findings of our study. Now we will use different statistical tools to test our hypothesis. For the sake of data analysis we will use linear regression and correlation. As agriculture credit is not a direct determinant of agriculture production, we will use an indirect approach for data analysis purpose. Firstly we will find correlation between production loans and different agriculture inputs.

Then we will use linear regression to check the dependability of agriculture production on these inputs. Aggregated results will expressly explain impact of credit on agriculture productivity. First of all we will consider different crops individually taken in the study sample for analysis purpose. We will find correlation of cultivated area, seeds and fertilizers with production loans. And we will run linear regression by taking cultivated area, seeds and fertilizers as independent variables and agriculture production as dependent variable.

4.2.1 Wheat

Wheat is one of the major crops of Pakistan. It's leading food grain and occupies central position in formulation of agriculture policies. It contributes about 14% to the agriculture sector and nearly 3% to GDP. However its performance is not that much significant as it was. This is the detailed performance of this crop in last decade.

Table :4.1 Inputs, Production And Yield Of Wheat

Year	**Agriculture inputs**			**Production**	**Production loan**
	Cultivated area (000 hectares)	**Seeds available (Million tons)**	**Off take fertilizer (000 nutrient tons)**	**(000 tons)**	**(Million Rs)**
2002-03	8034	168934.65	1369.87	19183	39061.279
2003-04	8216	175199.32	1461.50	19500	59042.255
2004-05	8358	183271.66	1847.00	21612	88992.269
2005-06	8448	195463.29	1902.10	21277	116617.452
2006-07	8578	203946.96	1835.80	23295	150479.259
2007-08	8550	190634.94	1790.50	20959	191335.329
2008-09	9046	215299.94	1854.50	24033	209308.820

2009-10	9042	215452.53	2180.00	23864	225016.171
2010-11	8805	226578.32	1965.80	24214	247488.089

Source: Federal bureau of Statistics
National Fertilizer Development
Ministry of Food and Agriculture
Federal Seeds Certification & Registration Department

A positive trend has witnessed in cultivated area for wheat since 2002 to 2008. However it decreased from 9046000 hectors to 8805000 hector in 2009-11 due to disaster and flood in northern areas and Sindh. In case of seeds availability there was an overall increasing trend however a mild variation was witnessed in 2007-08. GOP is giving subsidies on wheat seeds. Fertilizer supply has not been consistent due to different reasons.
Hoarding, lower domestic production and dear pricing were main impediments. Production shows a rising trend except 2007-08 and 2009-10. Agriculture productions loans however increased throughout the period under observation. Now we will apply correlation between production loan and agriculture inputs (cultivated area, seeds and fertilizers).

Table:4.1.1 Correlations Between Production Loan And Agriculture Inputs for Wheat

		Cultivated Area	Seeds Available	Offtake Fertilizer	Production Loan
Cultivated Area	Pearson Correlation	1	.917**	.829**	.919**
	Sig. (2-tailed)		.000	.006	.000
	N	9	9	9	9
Seeds Available	Pearson Correlation	.917**	1	.820**	.932**
	Sig. (2-tailed)	.000		.007	.000
	N	9	9	9	9
Offtake Fertilizer	Pearson Correlation	.829**	.820**	1	.802**
	Sig. (2-tailed)	.006	.007		.009
	N	9	9	9	9
Production Loan	Pearson Correlation	.919**	.932**	.802**	1
	Sig. (2-tailed)	.000	.000	.009	
	N	9	9	9	9

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

The above table shows correlation between loan and agriculture inputs. Correlation between cultivated area and production loan is 0.919 at significance level of .000. Pearson correlation between production loan and available seeds is .932 at a significance level of .000. The correlation between fertilizes and production loan is .802 at a significance level of .009. The overall results show that the correlation is significant. As significant relationship exists between inputs and credit, now we will apply regression to check the dependability of production on agriculture inputs. Following is the model of linear regression with multiple variables.

Y = a+b1x1+b2x2+b3x3+E
Y is dependent variable: agriculture production
a is Y intercept
x1 is first independent variable: cultivated area
x2 is the second independent variable: seeds availability
x3 is the last independent variable: offtake fertilizer
b1 is the multiplier of independent variable agriculture production
b2 is the slope/multiplier of second independent variable
b3 is the multiplier of third predictor

E is error term
This equation can be concluded as for wheat.
Y= -1431.836+0.928x1+.070x2+0.89x3+643.840

Table 4.1.2 Model Summary (Wheat)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.965[a]	.931	.890	643.840	3.646

a. Predictors: (Constant), Offtake Fertilizer, Seeds Available, Cultivated Area

b. Dependent Variable: Production

The value of R Square (it shows the level of dependability of criterion over the predictor) is .932 which represents the strong dependence of agriculture production on agriculture inputs Including seeds, area and fertilizers in case of wheat. It is known as co-efficient of determination which determines that one unit change in independent variable will cause how much change in dependent variable. Value of Durbin Watson represents negative auto correlation between the residuals. As in this case value of auto-correlation is 3.646. It means there is negative auto-correlation among the residuals.

Table: 4.1.3 Anova (Wheat)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.806E7	3	9351918.654	22.560	.002[a]
	Residual	2072652.038	5	414530.408		
	Total	3.013E7	8			

a. Predictors: (Constant), Offtake Fertilizer, Seeds Available, Cultivated Area

b. Dependent Variable: Production

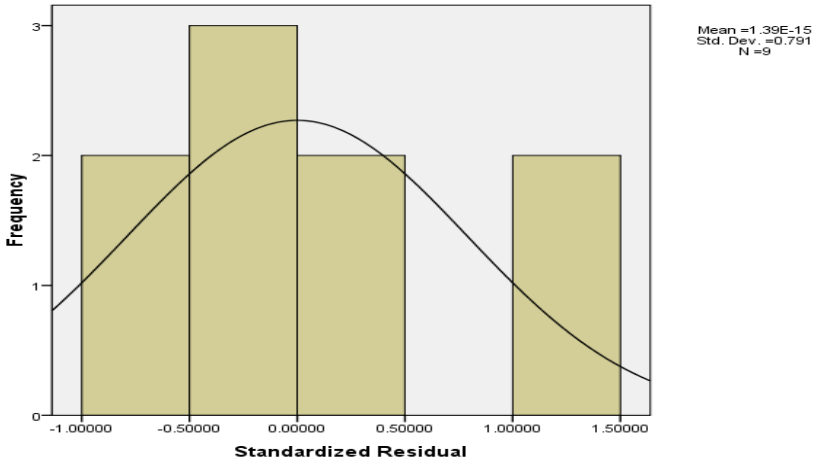
We are not much concerned with ANOVA table in our analysis. However the significance level is at .oo2 which fairly states that our model is representative of significant effect of independent variables over dependent variables.

Table: 4.1.4 Coefficient Between Agriculture Production And Agriculture Inputs for Wheat

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1431.836	9705.916		-.148	.888		
	Cultivated Area	.928	1.737	.167	5.434	.006	.141	7.112
	Seeds Available	.070	.030	.713	3.993	.022	.147	6.790
	Offtake Fertilizer	.890	1.710	.113	4.520	.020	.290	3.444

a. Dependent Variable: Production

It is the table of coefficients. It shows that in this particular case the impact of all three independent variables is significant over the independent variables. High value of Beta for cultivated area and fertilizers indicate strong dependability of production on these factors. The impact of seed available is also found significant. Variance Inflation Factor (VIF) is the measure of multicollinearity among independent variables, whereas multicollinearity refers to the inter dependability of independent variables. If its value is higher than a certain level it means that multicollinearity is present among independent variables and needs to be controlled before analysis. As the value of VIF (variance inflation factor) is less than ten for all three variables, it is an indication of mild to minimal collinearity among the independent variables.



For the application of regression the condition of normality should be complied with. It means that ideally the mean of residuals should be equal to zero and standard deviation should be equal to 1. If so it indicates valid and effective regression model application. In this particular case mean is very close to zero and standard deviation is a bit less than one. So condition is fulfilled. Histogram is drawn just to check this condition.
At the end of analysis, we came to know that there is strong correlation between agriculture credit and agriculture inputs. And agriculture production strongly depends on agricultural inputs. Hence, the agriculture credit has an indirect but profound impact on wheat production.

4.2.2 Rice

Rice is another major Kharif crop and main export item of country. Its value addition in agriculture is round about 6.4%. Pakistan is very famous in production of quality rice for domestic consumption as well as for export purpose. This is the detailed performance of this crop in last decade.

Table :4.2 Inputs, Production And Yield Of Rice

Year	**Agriculture inputs**			**Production**	**Production loan**
	Cultivated area (000 hectare)	**Seeds available (Million tons)**	**Off take fertilizer (000 nutrient tons)**	**(000 tons)**	**(Million Rs)**
2002-03	2225	5779.00	162.48	4478	39061.279
2003-04	2461	10239.06	173.34	4848	59042.255
2004-05	2520	11178.55	221.64	5025	88992.269
2005-06	2621	15812.50	228.25	5547	116617.452
2006-07	2581	14680.02	220.29	5438	150479.259
2007-08	2515	13868.37	214.86	5563	191335.329
2008-09	2963	31677.00	222.54	6952	209308.820
2009-10	2883	22253.00	261.60	6883	225016.171

2010-11	2365	24513.32	235.90	4823	247488.089

Source: Federal bureau of Statistics
National Fertilizer Development
Ministry of Food and Agriculture
Federal Seeds Certification & Registration Department

Cultivated area under rice crop has been subject to mild variation from 2002 to 2011. It has been reported highest in 2008-09. Trend of variation in seeds availability is exactly same as of cultivated area. Off take fertilizer presents a high level of variation in last decade such as from 2002 to 2008. Its shows a negative growth and after that its shows a positive trend only for one year. Hoarding and fluctuation in fertilizer prices are the main reasons for that. However production and respective loan for the crop shows a positive flow of increment from 2002 to till now.

Now we will apply correlation between production loan and agriculture inputs (cultivated area, seeds and fertilizers).

Table:4.2.1 Correlations Between Production Loan And Agriculture Inputs For Rice

		Cultivated Area	Seeds Available	Offtake Fertilizer	Production Loan
Cultivated Area	Pearson Correlation	1	.723*	.641	.526
	Sig. (2-tailed)		.028	.063	.146
	N	9	9	9	9
Seeds Available	Pearson Correlation	.723*	1	.672*	.843**
	Sig. (2-tailed)	.028		.047	.004
	N	9	9	9	9
Offtake Fertilizer	Pearson Correlation	.641	.672*	1	.802**
	Sig. (2-tailed)	.063	.047		.009
	N	9	9	9	9
Production Loan	Pearson Correlation	.526	.843**	.802**	1
	Sig. (2-tailed)	.146	.004	.009	
	N	9	9	9	9

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

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

The Pearson co efficient of correlation between production loan and cultivated area is .526 with significance level of .146. Apparently this relationship is not significant. It is measured as .843 with significance of .004 between seeds and production loan. Correlation between fertilizers and production loan is .802 with significance level of .009. This relationship is again significant, except in case of land area.

However correlation is significant as a whole at a level of .01. It means that rice crop inputs are dependent on agriculture production loan. As significant relationship exists between inputs and credit, now we will apply regression to check the dependability of production on agriculture inputs.

Table:4.2.2 Model Summary (Rice)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.972[a]	.944	.910	263.237	1.777

a. Predictors: (Constant), Offtake Fertilizer, Cultivated Area, Seeds Available

b. Dependent Variable: Production

The value of R-square is .944.it represents a strong dependability of rice production on inputs; cultivated area, seeds and fertilizers. It means any change in inputs will cause variation in production of this crop. Co-efficient

of determination explains a variation of 94.4%. That is if inputs are increased by one unit production will rise by .994. Durbin Watson's value is 1.77 near to 2 which fairly indicates minimal autocorrelation among residuals.

Table:4.2.3 Anova (Rice)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5837727.668	3	1945909.223	28.082	.001[a]
	Residual	346468.332	5	69293.666		
	Total	6184196.000	8			

a. Predictors: (Constant), Offtake Fertilizer, Cultivated Area, Seeds Available

b. Dependent Variable: Production

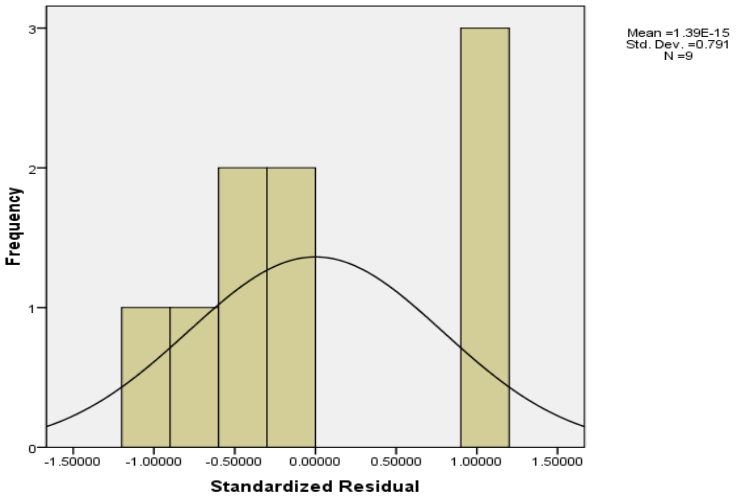
The level of significance as indicated in ANOVA table is .oo1. It shows highly significant impact of independent variables over dependent variable.

Table:4.2.4 Coefficients Between Agriculture Production And Agriculture Inputs For Rice

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3522.121	1347.122		-2.615	.047
	Cultivated Area	3.406	.607	.902	6.609	.002
	Seeds Available	.008	.018	.074	3.445	.015
	Offtake Fertilizer	.646	4.337	.022	.149	.887

a. Dependent Variable: Production

If we look at the table above we come across the fact that the most significant relationship exists between cultivated area and production. Beta is also highest in the case of cultivated area. It shows the strongest variability of production on cultivated area. Relationship between seeds available and production is also significant, however the impact level is far lesser than the cultivated area. The relationship between fertilizers and production is found insignificant.



This histogram indicates that assumptions of regression model are fulfilled. Mean of residuals is very close to zero whereas SD is about .80. Values show a little variation from ideal level but are still in acceptable range. It indicates fair model application.

At the end of analysis, we came to know that there is significant relationship between agriculture credit and agriculture inputs. And agriculture production depends on agricultural inputs. Here the agriculture credit has an indirect but moderate impact on rice production.

4.2.3 Cotton

Cotton is one of the most important Kharif crop of Pakistan with respect to productivity and foreign exchange earnings. It's contributed round about 1.8 percent towards the Gross domestic product and 8.6 percent towards the value added of agriculture product. The detail performance of the cotton with respect to agriculture inputs, production and production loan are as follows,

Table :4.3 Inputs, Production And Yield Of Cotton

Year	Agriculture inputs			Production	Production loan
	Cultivated area (000 hectare)	Seeds available (Million tons)	Off take fertilizer (000 nutrient tons)	(000 bales)	(Million Rs)
2002-03	2794	15690.38	697.62	10211	39061.279
2003-04	2989	17922.02	744.28	10048	59042.255
2004-05	3193	26937.98	923.50	14265	88992.269
2005-06	3103	31345.71	951.05	13019	116617.452
2006-07	3075	34169.67	917.90	12856	150479.259
2007-08	3054	29691.20	895.25	11655	191335.329
2008-09	2820	18645.11	927.25	11819	209308.820
2009-10	3106	28465.98	1090.00	12698	225016.171
2010-11	2689	28965.46	982.90	11460	247488.089

Source: Federal bureau of Statistics
National Fertilizer Development
Ministry of Food and Agriculture
Federal Seeds Certification & Registration Department

If we talk about the cultivated area with respect to this crop, we witnessed a mild variation from the last decade. This crop shows a positive trend in case of cultivated area from 2002 to 2007 and then shows a negative trend due to massively disaster fold in Pakistan especially in the area of Sindh. Seeds availability shows a consistent supply curve form 2002 to 2008, however I shows a negative flow from the last define periods which majorly and directly affect the production of this crop.

Fertilizer also shows the similar result like seeds availability and shows a positive and negative trend through the selected studied period. Production of the cottons is majorly affected by the shortage and fluctuation in the supply of fertilizer and seeds availability. However, institutional credit contribution in agriculture sector presents a positive trend from the last decade.

Now we will apply correlation between production loan and agriculture inputs (cultivated area, seeds and fertilizers).

Table:4.3.1 Correlations Between Production Loan And Agriculture Inputs For Cotton

		Cultivated Area	Seeds Available	Offtake Fertilizer	Production Loan
Cultivated Area	Pearson Correlation	1	.482	.272	-.217
	Sig. (2-tailed)		.189	.478	.574
	N	9	9	9	9
Seeds Available	Pearson Correlation	.482	1	.684*	.458
	Sig. (2-tailed)	.189		.042	.015
	N	9	9	9	9
Offtake Fertilizer	Pearson Correlation	.272	.684*	1	.800**
	Sig. (2-tailed)	.478	.042		.010
	N	9	9	9	9
Production Loan	Pearson Correlation	-.217	.458	.800**	1
	Sig. (2-tailed)	.574	.215	.010	
	N	9	9	9	9

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

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

Cultivated and production loan tends to be negatively related in this particular case, however other statistics indicate that this relationship is not significant. Apparently it looks that area is decreasing with increase in loan. But there are peculiar reasons responsible for this decrease in area under cultivation for Cotton. In practical situation there are a number of factors affecting the production. The area under cultivation is decreased because of flood, earthquakes and shifting of farmers towards other crops.

The correlation between agriculture production loan and seeds availability is .015.these values indicate a significant relationship. This is not that much significant as it was in the case of wheat and rice. It is because of change in the cultivation area due to above mentioned reasons.

The correlation between fertilizer and production loan is very strong. It is reported as .800 at the level of .010. In the case of cotton the relationship has not been as significant and strong as it was in the case of previous two crops. This variation is due to natural disasters. Furthermore there might be some problem with the data sources.

Table:4.3.2 Model Summary (Cotton)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.848[a]	.719	.551	913.119	3.053

a. Predictors: (Constant), Offtake Fertilizer, Cultivated Area, Seeds Available

b. Dependent Variable: Production

The value of co-efficient of determination is .719. The value of this determinant explains a sound dependability of production on agriculture inputs. If every input is changed by one unit the out means production will change by .719 units. The value of Durbin Watson indicates moderate negative auto-correlation among the residual values.

Table:4.3.3 Anova (Cotton)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.067E7	3	3557899.539	23.267	.023
	Residual	4168931.604	5	833786.321		
	Total	1.484E7	8			

a. Predictors: (Constant), Offtake Fertilizer, Cultivated Area, Seeds Available

b. Dependent Variable: Production

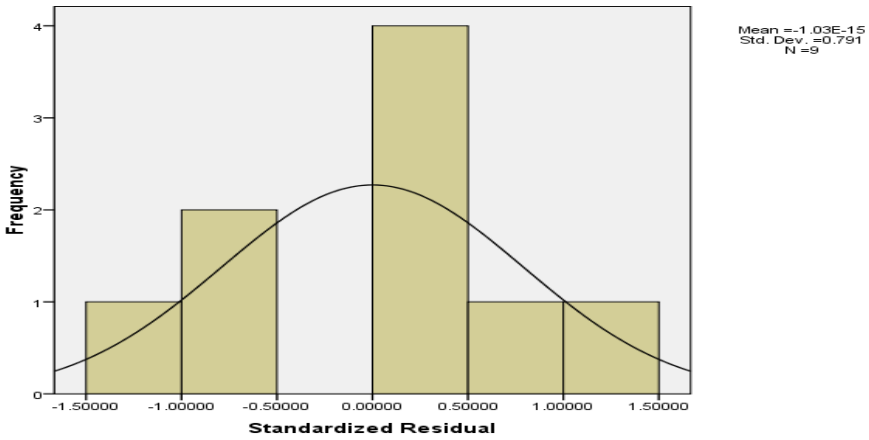
The ANOVA table states significance at .023. It indicates significant relationship between inputs and agriculture production.

Table: 4.3.4 Coefficients Between Agriculture Production And Agriculture Inputs For Cotton

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-4714.403	6449.495		-.731	.498		
	Cultivated Area	3.800	2.155	.479	6.764	.003	.762	1.313
	Seeds Available	.030	.074	.144	2.601	.025	.437	2.286
	Offtake Fertilizer	5.126	3.751	.446	7.367	.002	.528	1.896

a. Dependent Variable: Production

If we look individually on B of every agriculture input and respective level of significance, it indicates a significant relationship between production and every agriculture inputs. Effect is strongest in case of offtake fertilizer. The impact of seed availability is less significant as compared to other variables. The Values of VIF are even less than 5, the effect of multicollinearity is very low amongst the independent variables.



There are two conditions of regression model. The mean of residuals should be zero and SD should be one ideally. Means is very close to zero whereas SD is about .80. It means that conditions are fulfilled and application of model is valid.

At the end of analysis of cotton we came to know that agriculture inputs depend on agriculture credit except the cultivated area. Regression analysis indicates that production is dependent on agriculture inputs. So we can say that production loan increases agriculture production.

4.3Development Growth in Agriculture Sector and its Respective Loan

Development loan also play a significant role in agriculture production and are classified into two main categories which are as followed;

- Farm credit
- Non-farm credit

Farm credit is for the purchase of agricultural machinery ( ) and the installation of tube wells. Among total machinery we will discuss tractor loans only. Non-farm credit covers the live stocks, dairy poultry, fisheries and forestry. During twenty centuries investment in agriculture development sector was minor but now its show positive growth during last decade but still its portion in total agriculture loan portfolio is not reasonable. To analyze the effectiveness of this credit in agriculture development, we will conduct a time series analysis of development loans disbursed during last six years.

According to target monitoring and data compilation unit of state bank of Pakistan, development loan contribute only 6% in total portfolio. Low standard of agriculture infrastructure can be grow and enhance only by investing more and more in development sector of agriculture sector. Now days, advancement in technology in agriculture sector is the first priority to make improvement in agriculture sector so institutional credit have significant impact on agriculture production and development.

To analyze the impact of agriculture loan on the development segment of agriculture sector, we are going to take livestock (Non-farm base) and tractors and tube wells (Farm base) as a sample of study. As hypothesis is

H1: Institutional development loan is helpful in agricultural growth of Pakistan.

H0: Institutional development loan is not helpful in agricultural growth of Pakistan.

This is the second important hypothesis which tends to measure and analyze another important aspect of agriculture credit impact on agriculture. This other portion is known as development loan. Portion is directly related to development in the agriculture sector. So we don't need to go for an indirect analysis.

We will directly apply regression to credit and different variables of agriculture development. As discussed above we will consider development in terms of two categorizes farm based and non-farm based growth. Farm based growth will be measured in terms of production of tractors and installation of tube wells. Whereas we will take livestock only to represent non-farm based agriculture development in our model application. It is so because livestock contributes about 70% to total non-farm agriculture production.

4.3.1 Non-farm base development (Livestock)

Livestock has very vital role in Pakistani economy. In year 2009-10 its effect was very significant and dominant. It parted about 53% as value addition to the agriculture sector. Its contribution to Gross Domestic product of the country was 11.4% in 2009-10. Growing population, income and export earnings are emulating the demand of livestock and livestock products.

Remarkable improvement has been witnessed in livestock sector by considering many policies and development in this sector. Almost 9 policies have been regulated by Ministry of food and livestock with the collaboration of Government of Pakistan but with respect to our thesis requirement, we are only supposed to consider the initiatives and policies regulated by the financial institutions.

Ministry of livestock and dairy development was created as a part of reform agenda and the commitment of recent government to reduce poverty and achieve sustainable economic growth. They intend to expand the horizon of opportunities to rural and far flung communities. The detail regarding production and performance of livestock sector from the last decade are as follows,

Table:4.4 Livestock (Non-Farm) Production
(000 Tonnes)

Year	Milk	Beef	Mutton	Poultry meal	Others	Total
2002-03	27811	1060	702	370	8489.4	38432.4
2003-04	28624	1087	720	378	8747.7	39556.7
2004-05	29438	1115	739	384	9187.3	40863.3
2005-06	31970	1449	554	512	10715.3	45200.3
2006-07	32996	1498	556	554	11228.9	46832.9
2007-08	34064	1549	578	601	11772.5	48564.5
2008-09	35160	1601	590	652	12349.8	50352.8
2009-10	36299	1655	603	707	12962.3	52226.3
2010-11	37287	16789	690	830	13121.4	68717.4

Source: Federal Bureau of statistics
Ministry of Food and agriculture
Ministry of Livestock and Dairy Development

The above table shows that milk, beef, mutton and poultry are the foremost and significant part of livestock sector. Others included the wool, hair, bones, fat, blood, egg, hides and skins. The four most important parts of the livestock presented a positive growth rate from 2002 to 2011. The significant growths are to be considered in milk and beef.

Table:4.5 Non-Farm Base Development And Respective Loan

Year	**Livestock (000 tonnes)**	**Development Loan (Million Rs)**
2002-03	38432.4	12320.456
2003-04	39556.7	14403.605
2004-05	40863.3	19740.644
2005-06	45200.3	20856.950
2006-07	46832.9	18351.196
2007-08	48564.5	20225.327
2008-09	50352.8	23701.685
2009-10	52226.3	23104.310
2010-11	68717.4	15534.315

Source: Federal Bureau of statistics
Ministry of Food and agriculture
Ministry of Livestock and Dairy Development
Agriculture Credit Department (SBP

The detail regarding livestock production has already been discussed, so now we are going to check the impact of institutional loan on the livestock production by applying the statistical tool and measurements.
After applying the regression model we got following results.

Table:4.5.1 Model Summary (Livestock)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.548[a]	0.30	-.274	9675.13331	.629

a. Predictors: (Constant), Development Loan

b. Dependent Variable: Livestock

The model summary shows that the determination co-efficient is .30. This means that a 100% increase in loan will cause a change of 30% in the population of livestock. This proportion of dependability is a bit low because there is continuous variation in the loan amount. The value of Durbin Watson is .629 it means that there is positive correlation between the residuals.

Table:4.5.2 Anova (Livestock)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.046E7	1	2.046E7	.219	.654[a]
	Residual	6.553E8	7	9.361E7		
	Total	6.757E8	8			

a. Predictors: (Constant), Development Loan

b. Dependent Variable: Livestock

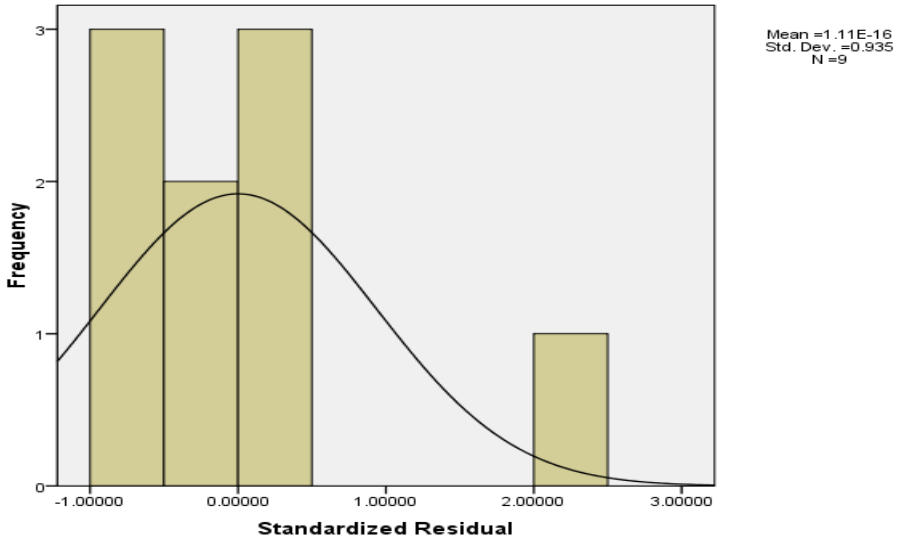
ANOVA table states that significance is .654. it means that the overall relationship between dependent and independent variables is significant.

Table:4.5.3 Coefficients Between Development Loan And Livestock

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	40199.255	16703.616		2.407	.047		
	Development Loan	.410	.877	.174	.467	.654	1.000	1.000

a. Dependent Variable: Livestock

Data analysis shows that the relationship between development loan and livestock is not significant. Even though the livestock contribution of sector to agriculture value addition and GDP is very significant banks are not investing in this sector that's why this relationship is not sustained.



This histogram clearly means that the condition of normality is met. Mean is very close to zero. And standard deviation is .935 means close to 1. So both conditions of linear regression are complied with.

4.3.2 Farm base development (Tractors and tube wells)

Farm base development is intended to increment in the technology and discover more new resources to make improvement in the production. In Pakistan, usually all financial institutions are intended to make 90 to 95 percent investment in tractors and tube wells. Advance technology enables the agriculture nations to make improvement in the quality of the products as well as increase the production as compared to other nations.

Technology is considered to be significant part of the agriculture sector and as we discussed earlier that most of the financial institutions make investment in tractors. As a rough estimated, 4 to 11 month has been taken in the delivery of tractors. Gap of 20000-25000 tractors has been witnessed in 200-07 then federal government allow import of used and new machinery in completely built unit (CBU) at zero tariff. Prices of tractors and other machinery have been increases from 2002 to 2011 on a consistent basis at the ratio of 10%.

To bring more land under cultivation, government with the collaboration of banks started a project in 2009-10 by name "Land and water resources development project for poverty in Pakistan". Under this project banks make investment in 300 bulldozers which is still under implementation. The numbers of tractors in operations are 69305 in per hectares HP available of 0.90 against the require power of 1.4 HP per hectares.

So all the discussion presented that credit has a significant impact on the farm base development segment of agriculture sector. The below table illustrate the detail performance of farm base segments of agriculture sector which are as follows,

Table:4.6 Farm Base Development And Respective Loan

Year	Installation of tube wells	Tractors	Development Loan (Million Rs)
2002-03	768962	27101	12320.456
2003-04	950144	36059	14403.605
2004-05	984294	44095	19740.644
2005-06	999569	49642	20856.950
2006-07	931306	54431	18351.196
2007-08	921121	53598	20225.327
2008-09	921229	60561	23701.685
2009-10	921229	69245	23104.310
2010-11	921183	69305	15534.315

Source: Federal Bureau of statistics

This table shows a positive growing trend in installation of tube wells from 2002 to 2006. However a significant decline has been witnessed in number of tube wells in next year due to massive earthquake in all over the Pakistan, after that we observed the consistent growth in number of tube wells from 2008 to 2011. On the other hand, consistent positive growth rate has been observed from last decade which massively effect the agriculture growth. Some variation has been observed in case of development loan but a significant decline has been witnessed in year 2011.

As significant relationship exists between farm base inputs and credit, now we will apply regression to check the dependability of farm base production on agriculture inputs.

Firstly we will discuss relationship between Tube wells and development Loan.

Table:4.6.1 Model Summary (Tube Wells)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.529[a]	.280	.177	59281.457	1.422

a. Predictors: (Constant), Development Loan

b. Dependent Variable: Tube wells

The value of R-square is .280. It is our co-efficient of determination which explains dependability of dependent variable on independent variable. The value of Durbin Watson is 1.422. As it is close to 2 means that auto correlation between the residuals is minimal.

Table:4.6.2 Anova (Tube Wells)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9.550E9	1	9.550E9	2.718	.143[a]
	Residual	2.460E10	7	3.514E9		
	Total	3.415E10	8			

a. Predictors: (Constant), Development Loan

a. Dependent Variable: Tube wells

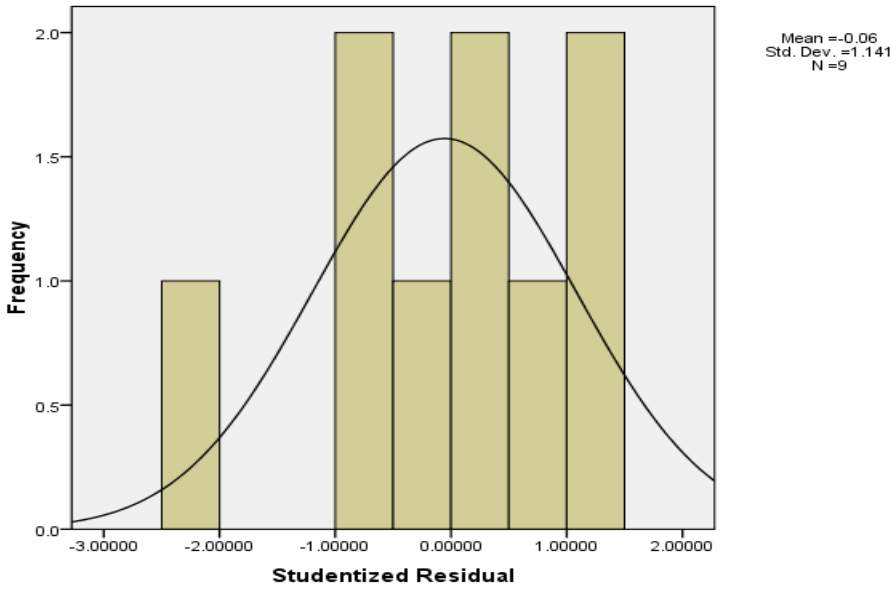
The significance as indicated by ANOVA table is .143. Its value indicates that the relationship between dependent and independent variable is insignificant. The reason behind this insignificant relationship is that banks are not lending for tube well installation. Only ZTBL is working on an irrigation project known as "Sairab Pakistan Scheme".

Table:4.6.3 Coefficients Between Development Loan And Tube Wells

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	758796.018	102345.418		7.414	.000		
	Development Loan	8.856	5.372	.529	1.648	.143	1.000	1.000

a. Dependent Variable: Tube wells

As discussed above that the relationship between tube wells and production loan is in-significant.



This histogram indicates that the condition of normality is nearly met. Standard deviation is 1.1 which is very close to one. On the other hand residuals show a little variation from the desire result.

Now we will discuss relationship between tractors and development loans by applying all the define statistical tools which are as follow,

Table:4.6.4 Model Summary (Tractors)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.630[a]	.396	.310	11814.951	.602

a. Predictors: (Constant), Development Loan

b. Dependent Variable: Tractors

The value of co-efficient of determination is .396 and that of Durbin Watson is.602.

Table:4.6.5 Anova (Tractors)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6.418E8	1	6.418E8	4.598	.022[a]
	Residual	9.772E8	7	1.396E8		
	Total	1.619E9	8			

a. Predictors: (Constant), Development Loan

b. Dependent Variable: Tractors

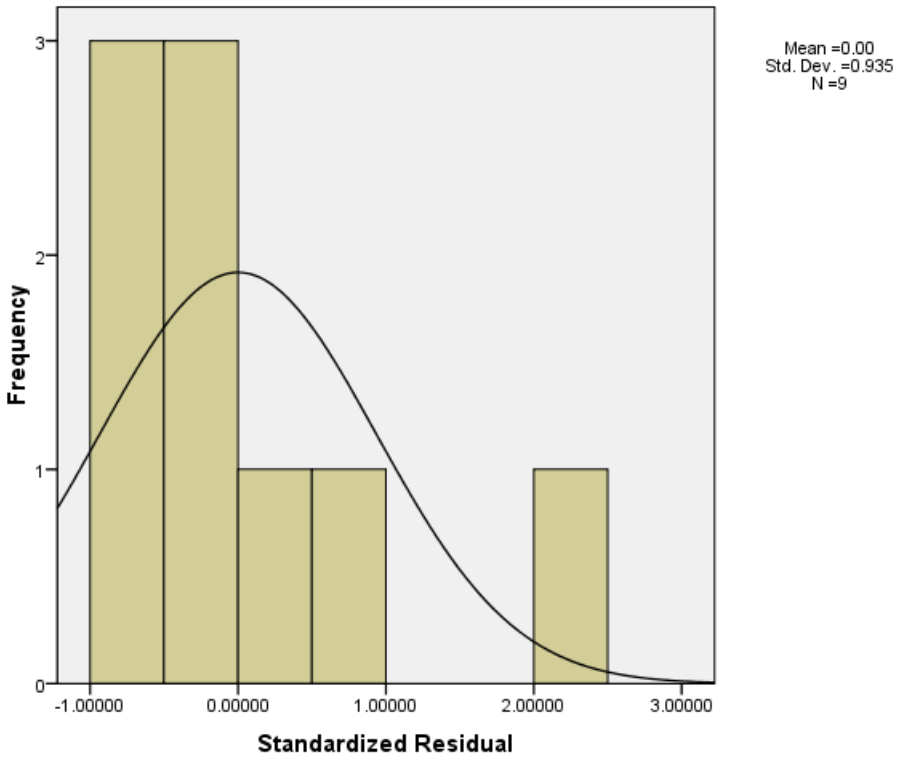
The significance as indicated by ANOVA table is.022. As its value is less than.025 means that the relationship between dependent and independent variable is significant.

Table:4.6.6 Coefficients Between Development Loan And Tractors

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8644.411	20397.713		.424	.684
	Development Loan	2.296	1.071	.630	6.144	.022

a. Dependent Variable: Tractors

The above table indicates that the relationship between the development loan and the number of tractors is significant. Most of the development loans are for tractors. There is no need to discuss collinearity because there is only single independent variable so it will be not be pertinent to discuss it in this individual case.



This histogram indicates that the conditions of normality are perfectly met in this particular case. The value of mean of residuals is exactly 0.00. Standard deviation is .935 very close to one. This means that this regression model is well valid. Both of the conditions are fairly close to the ideal standard.

4.4 Banking performance in agriculture landings

To promote and enhance the scope of agriculture sector in term of production and yield, financial institution plays a vital role in this sector. Agriculture credit advisory committee (ACAC) of State Bank of Pakistan devises the rules and regulations and requirements of credit for agriculture sector and the limit of credit for specific fiscal year will be approve by national credit consultative council (NCCC).

To analyze the performance of financial institutions with respect to agriculture lending, we will conduct the time series analysis by viewing following points.

- Target limit for every bank given by agriculture credit advisory committee
- Make comparison between credit target limit and actual credit disbursement
- Make the relationship between disbursed loan and non-performing loan

By analyzing the above points, we will conclude the extent to which financial institution perform in terms of production and development of agriculture sector.

We will complete this part of our research work without any kind of model application. We will only discuss the targets given to different banks by State Bank of Pakistan, their outstanding amounts and recoveries. As we are to discuss simple targets and disbursements so regression are correlation make no sense. Furthermore it will include the modes of bank lending. The discussion will include individual bank wise details of targets, disbursements and performance.

TABLE:4.7 TARGETS, DISBURSEMENT, RECOVERIES AND OUTSTANDING CREDIT (2005-06) (Million Rs)

Banks	Target	Disbursement	Recovery	Outstanding
Z.T.B.L	43000	47594.136	46251.505	79851.144
P.P.C.B.L	9000	5889.490	5991.789	7277.072
Schedule banks	63000	67967.397	56043.784	50040.806
Domestic private banks	15000	16023.379	12307.196	12921.247
Micro Finance banks	0	0	0	0
Grand total	130000	137474.402	120594.274	150090.269

Source: Agriculture Credit Department (SBP)

In fiscal year 2005-05 Z.T.B.L was given a target of PKR. 43000M. but actual disbursements were about 10% more than target. Recoveries during the year amounted to 46251.505 M. even then the outstanding amount was 1.8 times of the target. PPCBL was assigned a target of PKR 9000. But its lending during the year was only about 60% of the target. It recovered about as much as it disbursed during the year.7.2 Billion is still outstanding from this sector. This large outstanding sum was main hindrance for PPCBL in achieving its target.

The total disbursement by Schedule banks in this year was PKR.67967.397 which was 8% more than the targets. They recovered 56B in 2005-06. Their outstanding sum is about PKR.50 B. Domestic Private Banks extended 16.023 billion against the target of 15billion. They outstanding amount is PKR. 12921.247. Recovery for the year was PKR. 12307.196. The total target for banks in fiscal year 2005-06 was PKR.130 billion for Agriculture sector. Actual financing during the year was 5.69% more than the target. All the banks collectively recovered PKR 120594.274 during the year, and outstanding amount is 15billion. Overall performance during the year was good.

TABLE:4.8 TARGETS, DISBURSEMENT, RECOVERIES AND OUTSTANDING CREDIT (2006-07) (Million Rs)

Banks	Target	Disbursement	Recovery	Outstanding
Z.T.B.L	48000	56473.047	54080.855	66755.727
P.P.C.B.L	9000	7988.057	6484.151	8775.979
Schedule banks	80000	80393.190	76774.569	53659.427
Domestic private banks	23000	23976.161	18797.410	18099.998
Micro Finance banks	0	0	0	0
Grand total	160000	168830.455	156136.985	147291.131

Source: Agriculture Credit Department (SBP)

State Bank of Pakistan assigned a target of PKR 48000 M to ZTBL in FY 2005-06. Its advances were about 17.6% more than the target. Recovery was 1.126 times of the target during the year. Outstanding amount at the yearend was 66755.727 M. it disbursed 18.6% more than the previous year. Target for PPCBL was 9000 million against which a sum of 7988.057 M was actually extended to farmers for different purposes as agriculture loan. Recoveries amounted to72% of the target.

The extent of outstanding exposure of PPCBL in agriculture sector was 97.51% of the target in this sector. Schedule banks disbursed 80393.190 million against the target of 80 billion. Their outstanding exposure in the agriculture sector at the yearend was 67% of the recent year target whereas the recovered as much as the 96% of the target. They recovered a handsome amount and significantly lowered the outstanding amount. Scheduled banks assumed the highest exposure in agriculture sector and performed remarkably. Domestic Private Banks extended 23976.161 million against the target of 23billion. They outstanding amount is PKR 18099.998 million. They recovered 18797.410 million during the year.

The total portfolio volume set by SBP for agriculture sector during FY 2006-07 was 160 billion which 23% higher than the previous year target was. Disbursed amount in this period was also by the same proportion from the last year. Recoveries and outstanding amounts during 2006-07 were 15.6 B and 14.7 B respectively. If banking performance is seen in this perspective (target, disbursement and recoveries) it was even better as compared to previous years.

TABLE:4.9 TARGETS, DISBURSEMENT, RECOVERIES AND OUTSTANDING CREDIT (2007-08) (Million Rs)

Banks	Target	Disbursement	Recovery	Outstanding
Z.T.B.L	60000	66938.900	60647.475	75339.386
P.P.C.B.L	8000	5931.45	6282.98	10032.652
Schedule banks	96500	94749.293	88444.612	57609.693

Domestic private banks	35500	43940.923	36421.291	25633.281
Micro Finance banks	0	0	0	0
Grand total	200000	211560.656	191795.676	168615.012
Source: Agriculture Credit Department (SBP)				

As we know that ZTBL is a specialized bank for agriculture sector so it is given the highest target among all the banks. It was given a target of 60000 m in 2007-08. It disbursed about 156% of the target during the year. It recovery figure during the year was as high as its target of that year. Total outstanding sum was reported as 125% of the target amount at the yearend 2007-08.

PPCBL disbursed a total of Rs. 5931.45 million against a target of 8000M. It is not meeting target its target because large outstanding sum and nonperforming loans. However it's a positive sign that in 2007-08 the recoveries were 6282.98 M greater than the amount disbursed during the year. Its outstanding amount is Rs.10032.652M

The SBP gave a target of PKR 96500M to scheduled banks in fiscal year 2007-08. Those disbursed 94749.293 M, a bit below than the target. Total recoveries during the year were about 91.6% of total target. The outstanding amount is 57.6 B. Domestic Private Banks were assigned a target of taking exposure of PKR 35500M in agriculture sector and the actual performance was higher than the target and it was reported as 43940.923M. The amount of recoveries during this year was even a bit higher than the target. The outstanding agriculture loans were reported at 25.6B at the yearend.

If we look at the total target specified by central bank during FY07-08 it was PKR 200000 M. it was 25% more than the previous year target. PKR 211560.656M was the total amount of loan that was given by all the banks in Pakistan to farmers. Recoveries were about 90.6% of total disbursed amount during the year and total outstanding amount was168615.012 M.

If we cast an overall look over the agriculture credit portfolio in Pakistan, the performance of banking sector is satisfactory as per the parameters set by State Bank of Pakistan. Most of the banks are reaching their targets except the few. On the other hand volume of the portfolio is also increasing every. The major investment always has been in the production sector. From start till now 80-90% of the portfolio has been awarded for crop inputs and keeping the development aspect least attended.

TABLE:4.10 TARGETS, DISBURSEMENT, RECOVERIES AND OUTSTANDING CREDIT (2008-09) (Million Rs)

Banks	**Target**	**Disbursement**	**Recovery**	**Outstanding**
Z.T.B.L	72000	75138.549	69970.924	83754.942
P.P.C.B.L	6000	5579.428	7366.504	9428.624
Schedule banks	119500	110665.998	110008.067	56306.176
Domestic private banks	52500	41626.330	42676.721	24264.650
Micro Finance banks	0	0	0	0
Grand total	250000	233010.505	230022.217	173754.392

Source: Agriculture Credit Department (SBP)

The total target of FY 08-09 was 72000 M. it was 20% higher than the previous year target. It was 5% higher than the target. Recovered sum during the year by ZTBL was 69970.924M. However still there was an outstanding was 83754.942M. PPCBL was given a target of 6000M for the year. It disbursed 92.99% of the target. Its recovery during the year was remarkable. It recovered more than its disbursement and target during the year amounting to PKR7366.504. Outstanding loan from farmers is 9428.624M.

Scheduled banks extended funds worth PKR110665.998 million against a target of 119500 M during the financial year 2008-09. Recoveries made during the year were 110B. At the yearend there was an outstanding sum of 56306M.As indicated by the figures that scheduled performed better during the year.

Domestic private banks were assigned a target of 52500M during the year however they underperformed from the target a bit. They could extend only 41626.330 million. 41.6 B and 42.6 B were their target and recovery respectively during the year. The outstanding sum at the yearend was 24264.650M. There was no participation of Microfinance Banks in agriculture sector till the yearend 2008-09.

The total lending towards agriculture sector by all the banks in Pakistan was 233010.505M against a target of 250000M. Target was set 25% higher than the previous year. Total recoveries during the year were amounted to PKR 230022.217 M. the outstanding sum at end of the year was 173.7B.

TABLE:4.11 TARGETS, DISBURSEMENT, RECOVERIES AND OUTSTANDING CREDIT (2009-10) (Million Rs)

Banks	**Target**	**Disbursement**	**Recovery**	**Outstanding**
Z.T.B.L	80000	99012.354	73272.787	94466.201
P.P.C.B.L	6000	5721.730	7280.641	8814.546
Schedule banks	124000	119608.984	123699.478	54579.772
Domestic private banks	50000	43777.410	43284.947	25555.129
Micro Finance banks	0	0	0	0
Grand total	260000	248120.481	247537.853	183415.648

Source: Agriculture Credit Department (SBP)

In fiscal year 2009-10 Z.T.B.L was given a target of PKR. 80000M. but actual disbursements were about 23.75% more than target. Recoveries during the year amounted to 73272.787 M. even then the outstanding amount was 1.8 times of the target. PPCBL was assigned a target of PKR 6000M. But its lending during the year was about 95.36% of the target. It recovered about 7280 M during the year.8814.546 M was still outstanding from this sector at the yearend. This large outstanding sum was main hindrance for PPCBL in achieving its target.

The total disbursement by Schedule banks in this year was PKR. 119608.984 M which was a bit lower than the target of PKR 124000M. They recovered 123699.478M in 2009-10. Their outstanding sum is about PKR.54.57 B. Domestic Private Banks extended 43.77 billion against the target of 50billion. The outstanding amount is PKR. 43284.947M. Recovery for the year was PKR. 25555.129 M.

The total target for banks in fiscal year 2009-10 was PKR.260 billion for Agriculture sector. Actual financing during the year was 4.8% less than the target. All the banks collectively recovered PKR 247537.853M during the year, and outstanding amount was 183.4billion. Overall performance during the year was good.

TABLE:4.12 TARGETS, DISBURSEMENT, RECOVERIES AND OUTSTANDING CREDIT (2010-11) (Million Rs)

Banks	Target	Disbursement	Recovery	Outstanding
Z.T.B.L	81800	65361.394	72348.571	94447.516
P.P.C.B.L	6850	7161.543	8655.591	8871.480
Schedule banks	132450	140312.440	134730.832	63800.463
Domestic private banks	48900	50187.026	51711.565	26189.428
Micro Finance banks	0	0	0	0
Grand total	270000	263022.403	267446.559	193308.887

Source: Agriculture Credit Department (SBP)

ZTBL was given a target of 81800 m in 2010-11. It disbursed only 80% of the target during the year. It recovery figure during the year was 72348.571M. Total outstanding sum was reported as 94447.516M of the target amount at the yearend 2010-11.

PPCBL disbursed a total of Rs.7161.543 million against a target of 6850M. It's a positive sign that in 2007-08 the recoveries were 8655.591 M greater than the amount disbursed during the year. Its outstanding amount is Rs. 8871.480M.

The SBP gave a target of PKR 132450M to scheduled banks in fiscal year 2010-11. Those disbursed 140312.440 M, a bit below than the target. Total recoveries during the year were about 96.6% of the disbursed sum. The outstanding amount was 63800.463M. Domestic Private Banks were assigned a target of taking exposure of PKR 48900M in agriculture sector and the actual performance was higher than the target and it was reported as 50187.026M. The amount of recoveries during this year was even a bit higher than the disbursed amount. The outstanding agriculture loans were reported at 26.2B at the yearend.

If we look at the total target specified by central bank during FY10-11 it was PKR 270000 M. it was 3.7% more than the previous year target. PKR 263B was the total amount of loan that was given by all the banks in Pakistan to farmers. Recoveries were about 110% of total disbursed amount during the year and total outstanding amount was 193308.887M.

TABLE:4.13 COMPOSITION OF AGRICULTURE LOAN DISBURSED BY FINANCIAL INSTITUTIONS (Million Rs)

Year	Production loan	Development loan	Total loan
2005-06	116617.452	20856.950	137474.402
2006-07	150479.259	18351.196	168830.455
2007-08	191335.329	20225.327	211560.656

2008-09	209308.820	23701.685	233010.505
2009-10	225016.171	23104.310	248120.481
2010-11	247488.089	15534.315	263022.403
Source: Agriculture Credit Department (SBP)			

As already discussed in detail that mainly agriculture loan is divided into two categories, production loan and development loan. Production loan includes financing for seeds, fertilizers and pesticides. Whereas development loans are extended as farm based and non-farm based credit. Farm based are advanced for purchase of tractors and installation of tube wells. Non-arm based credit is majorly for livestock. However we will discuss the proportions of two major types only.

In FY 2005-06 total banks lending in the agriculture sector was 137474.402M. 84.83% of the total amount was extended as production loan. Rest of the amount was given as development loan to farmers. In the next FY the sum of 150479.259M was advanced as production loan by all the banks in Pakistan. It was 89.13% of the total agriculture portfolio for 2006-07.

The sum of 211560.656 M was the total agriculture portfolio in 2007-08. Only 9.56% of the total amount was disbursed for development purpose. Rest of the amount was given to farmers as production loans. In FY 2008-09 the total agriculture portfolio was 233010.505 M. 89.83% of the total amount was extended as development loan.

In the next year total disbursed amount by all the banks to agriculture sector was 248120.481M. Only 9.32% was for development purpose. The rest of the amount was advanced as production loan. In FY 2010-11 a sum of 247488.089M was advanced as given as production loan which accounts for 94.09% of the total portfolio advanced to the agriculture sector.

V. Conclusion

In this study, an attempt was made to uncover the role of bank credit in agriculture sector of Pakistan. With the help of literature review, analysis of empirical data we came to the following points.

In the first part of study we tried to explain the impact of development credit on production segment of the agriculture sector. Combined results of Pearson correlation and regression analysis indicate the alternate hypothesis is accepted. It means that credit does impact the production. In case of wheat there was exceedingly strong correlation between the agriculture inputs and production credit. Regression analysis also indicated fairly large dependability of production on these factors. So discussion for this crop indicates the significance of credit for crop productivity.

The result of investigation was also similar in other two crops under study. The magnitude of significance was lower because of some peculiar reasons. In case of rice the relationship between credit and cultivated area is not sustained. It was because of heavy rains in 2007 and massive floods in 2010.In 2010 floods destroyed about 2.364 M hectors area and two kharif crops rice and cotton were mainly affected. However, the relationship is significant.

In case of cotton pooled results of correlation and regression analysis support the argument that production is positively affected with the rise in agriculture credit for production. The nature and extent of relationship is just like rice crop. The problem with the cultivated area is same as discussed in the above paragraph. The impact of fertilizer is also shown weaker. It is because of lack of availability of fertilizer. This problem is almost similar for every crop. The values of correlation between credit and cultivated is .919, .526, (217) for wheat, rice and cotton respectively. The correlation is strongest in case of wheat whereas reason of other two cases have already been explained above.

The correlation between seeds and credit is .932, .843 and .458 for wheat, rice and cotton respectively. This relationship is significant in the case of all three crops. These statistics clearly indicate that seeds availability is affected positively with the increase of production loan. Correlation between credit and fertilizer is .802, .802 and .800 for wheat, rice and cotton respectively. Result is almost same in the case of all three cases. It shows strong positive correlation between credit and fertilizers.

The value R square is .931, .944 and .719 for wheat, rice and cotton respectively. It the co-efficient of determination and explains the dependability of agriculture production on these variables. These values indicate strong dependability of agriculture production on seeds, fertilizer and cultivated area.

From the above mentioned discussion of statistics results are self-evident. Production is dependent on agriculture inputs and inputs largely depend on credit availability. Hence production is affected by institutional credit. Our study sample includes three major crops having highest share in crop production, so we can infer that overall crop production and institutional production loans are positively correlated. Hence H1 is accepted.

This relationship is significant because 85-90% agriculture bank lending pertain to production loans. As bank is mainly lending to this sector and results are in the form of increased productivity.

In the second part of our research project we analyzed the effectiveness of development loans. This segment is divided further into two parts; farm based and non-farm based. Non-farm based portion includes livestock, forest and fisheries. As livestock is the main element of this segment so it was made the sample for study. Statistical analysis (regression between development loan and livestock) indicates that relationship between the agriculture development loan and livestock production is insignificant.

Livestock contributes 51% as value addition to the total agriculture sector production. Despite of the fact banks do not invest in this sector, there are only two schemes "White Revolution" and "Red Meat Financing". These schemes attach much conditionality's to obtain finance from banks. These schemes are so devised that small farmers and livestock growers cannot benefit from it. Banks are not performing in this sector even then there is a continuous growth because of heavy government investment in this sector.

The other category is farm based credit and it includes tube wells and tractors. Both determinants are analyzed here separately. The regression analysis indicates insignificant relationship between production loan and tube wells. This result is supported but the argument that only ZTBL is advancing for installation of tube wells. Even ZTBL has only a single scheme known as "Sairab Pakistan Scheme" for tube wells. Total exposure of ZTBL in under this scheme is 14713M.

Empirical data analysis indicates significant relationship between bank lending and production and number of tractors. The major proportion of development loans are extended for tractors. This is the sole segment which holds significant relationship with the development loan. However, the value of R square is .396. The value of coefficient of determination indicates the dependability is relatively low. It is because of low total portfolio of agriculture development loans. It accounts for hardly 10% of total agriculture loan portfolio.

The above discussion shows that banks are not lending properly in development segment of agriculture. Relationship is insignificant for livestock and tube wells. It is significant for tractors but co-efficient of determination is very low. Total portfolio of agriculture development loans is also very low. So, null hypothesis is accepted that banks are not effectively contributing to development sector of agriculture.

Lastly, we have studied the performance of banking sector in agriculture financing. The performance of banks has been analyzed in terms of targets given by state bank of Pakistan. Banks are performing better in terms of their targets. Empirical analysis of data indicates the banks usually exceed their targets set by SBP. Furthermore, the total lending of financial institutions showed a continuous upward trend since many years. So, we conclude that null hypothesis is rejected and alternate hypothesis is accepted.

If we look the performance of financial institutions in terms needs of borrowers then results might not be that much satisfactory. Lending mechanisms and schemes are so devised that farmers working at economic and above economic level are mainly benefitted by these facilities. Subsistence level farmers feel many problems to get credit. From 2007 to 2011 there is continuous decline in loan amount to small farmers. However, banks are working in line with SBP guidelines.

In the end if we glance at the lending pattern of banks we come across the fact that 85-90% loan is given for crop inputs. The proportion of development loans is very low. Despite of these two aspects banks are still operating as per schemes of central bank's policies. So we can say that banks are significantly performing in agriculture sector.

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