

CHAPTER- I

1.1 Introduction

Nepalese economy is fully dependent in agriculture production. In the least developed Agricultural development is a precondition for growth and industrialization. Countries like Nepal majority of the total population find their subsistence in agriculture. The most part of the industrial sector in Nepal is also based in agricultural; its raw materials come from agriculture. For example, jute, sugar, tobacco, herbal and aurvedic medicine, paper, cotton, carpet and matches etc are heavily depending on agriculture even many of its by-products have been main inputs, for the industrial production. This sector has been a major source of production, income and employment opportunities in Nepal. We can see agriculture sector full of potentialities in export promotion, industrial development and expanding employment opportunities. In the context of Nepalese economy, we can say that, the level of economic development depends upon level of agriculture development i.e. agricultural production. Agricultural development leads to rise in income, which further leads towards rise in saving and rise in investment. The market for manufactured goods will expand. It will stimulate industrial development. If the agricultural productivity can be increased quite substantially to reach to the level of surplus. It can be utilized in expansion of export.

Agricultural production plays an important role for eliminating poverty and uplifting the living standards of the masses as per the following ways.

- ❖ Increase food surplus to the rapidly growing population.
- ❖ Provide capital as well at latest technology for agro- industries.
- ❖ Find market for agro-based industrial products.
- ❖ Raw materials to the manufacturing industries the depend on agricultural.

1.2 Agricultural Production

Nepal is predominantly an agricultural country where 75 percent of total population depend upon agriculture. Agricultural is the only sector which plays vital role in the

economic development of the country like ours. Agriculture along contributed 32.3 percent to the GDP and above 50 percent of the total exports of the country. Besides this most of the industries depend upon this for raw materials. That is why agricultural sector is considered to be the back bone of the Nepalese economy. “Agriculture is the principal sources of livelihood and it plays significant role in economic development in the rural sector credit is the main factor for agricultural development” (Ojha, 1997)

Nepal has 14.1 million hectares of total land area of which 16 percent is under cultivation. So irrigation facilities cover only 44 percent of the total cultivated land of it. The number of person depending on per hectare of land is 7.6 persons in the hill and 3.2 person in the Terai 1 percent. But the agricultural sector suffers from many problems. In comparison to the developed countries per person productivity in Nepal is very low. Nepal is facing the problem of rapid population growth. The productivity of land does not keep pace with the rate of population growth. The productivity land is very low. Traditional type of farming gives low return. Besides this inadequate agriculture credit, lack of proper irrigation facility and proper agriculture marketing system have created big problem before the task of agriculture development. Our government has made several efforts to improve the condition of agriculture sector. As for example land reform measure was introduced for proper distribution of land-holdings there by increasing productivity and production. In every plan this sector has been accorded to priority. Even then the productivity and production in this sector has not indicate only sign of progress. Farmers are under vicious circle of poverty the result is that farmers don't have the capacity to save and consequently low level of income which further lead to low productivity and low income.

“Unless productivity poor man of this vast population and per area of scarce cultivated land is increased income of the people can hardly be raised. The vicious circle of low income leading to a low rate of investment and hence the result of low productivity in agriculture at present” (Shrestha 1996).

Overall trends have been presented the productivity scenario is cereal crops, cash crops and other crops. The productivity of paddy as a major cereal crops. Preliminary estimate shows the growth in paddy cultivated area, production and productivity in the current fiscal year paddy production is expected to rise by 5.2 percent to a little more than 4.5 million MT as against the last year's production 4.3 million MT. This

has been the second consecutive rise in paddy production similarly, cultivated area is expected to rise by 0.5 percent (from 1,549,000 ha in the last fiscal year to 1,556,000 ha). Productivity of rice crop is also expected to rise by 5.0 percent to 2,907 kg. per ha. Due to early start of monsoon rains and sufficient rainfall between mid July and mid September there has been increases in paddy cultivated land and productivity with the increment in over all rice production. The production of maize in the current FY 2008/09 is expected to rise by 2.8 percent to 1,931,000 MT as against the 1,879,000 MT production in the last fiscal year. The preliminary estimate is that the productivity will rise by 2.0 percent to 2,205 kg per ha in the review year. Likewise, the area under maize cultivation is also expected to increase slightly and reach 875,000 ha. Despite having low maize production in some districts due to excessive rainfall and widespread disuses, there has been better maize production in hilly and mountain regions and increase in the area of non seasonal and spring maize and the rise in overall production of maize

Wheat production is expected to fall by 14.5 percent totaling 1,344,00 MT in the current fiscal year as against 1,544,000 MT in the last fiscal years. The fall in wheat estimated production and area under cultivation of wheat is due to the absence of long monsoon rain and snowfall. Cultivation area of the crops is expected to shrink by 1.6 percent to 695,000 ha from 706,000 ha of the last fiscal year with subsequent fall in the productivity of wheat by 13.1 percent expected for this year. Production of barley is expected to record a fall year despite its cultivation area remained the same in the current fiscal years to that of the previous year. The total cultivation area and the production of barley is estimated 25,817 ha and 23,244 MT respectively in the year in review. The reason behind the decline in its production could be mainly due to inclination of farmers towards other cash crops and long winter drought. Millet is estimated to register a marginal increase of 0.7 percent to 293,000 MT this fiscal year as against last year's 291,000 MT. Productivity of this crop is also expected to increase by 0.5 percent to 1101 kg. per ha as against last years 1,096 kg per ha.

On cash crops, the production of oilseeds (Mustards, sun flower. etc.) fell by 1.5percent in FY 2007/08 to 134,000 MT as compared to the previous year. Preliminary estimations show that the production of these crops will increase by 1.5 percent totaling 135,000 MT this year. In FY, 2007/08, area under such crops

decreased by 2.2 percent totaling 184,000 hectares. As per the preliminary estimates, the area under this crop will reach to 181,000 hectares with minor increment in the current fiscal year. The area had decreased by 2.2 percent to 180,000 hectares in FY 2007/08. In FY 2008/09, there has been minor growth in the area under cultivation of potato, its production, and productivity as compared to that of last year, while area and production of sugarcane, tobacco, and jute crops are expected to fall in the same fiscal year.

Production of other crops of pulses (lentil, black. gram, pigeon peas, soybean, etc) is expected to drop by 50.2 percent to 256,000 MT this FY 2008/09 as against the production of 270,000 MT in the last fiscal year. However, fruit production is expected to rise by 6.0 percent to 669,000 MT this fiscal year against last year's 631,000 MT. Similarly, the production of green vegetables is expected to rise by 7.8 percent to 2,722,400 MT from 2,539,000 MT. There has been continuous growth in the production of green vegetable as cash crops in recent years.

As a share of the output of the major agro products in FY 2007/08, Food crops comprised 49.8 percent; cash crops 28.0 percent and 21.2 percent shared by rest of the crops. It is expected that of the total crops, food crops share will be 49.6 percent while the share of cash crop will be 28.1 percent and the share of the rest will remain 22.3 percent in the current fiscal year. Reason for gradual decline in production of cash crops is due to shrinking cash crop cultivation area since preceding years. (Economic Survey 2008/09)

In the traditional sources they have obviously no organized source of credit charge exorbitant rate of interest. The high rate interest gives extra burden on the poor farmers. Therefore income from the agriculture is low. Due to this reason His Majesty's Govt. has been trying to develop institutional credit system. As a result of this effort agricultural Development bank was established in the year 1986 which the only agriculture financing institution in the country. The role of ADB/N is provide credit to the farmers for improved seeds, fertilizers, equipments and for providing irrigation facilities etc. since its establishment ADB/N has been working in accordance with its objectives. Even then it has not been able to provide sufficient amount of credit to the farmers.

1.3 Statement of the Problem

Although agriculture is the main stay of Nepalese economy and it has employed majority of population, the condition of people is not good except of some big farmer. Most of people are engaged in agricultural activities but there is disguised unemployment. Presently in Nepal more than 75 percent of total population is engaged in agriculture. They partly work on the field approximately for 6-7 months in a year rest of time they are idle without work. Agriculture accounts for 32.3 percent of gross domestic product (GDP) at factor cost. (Economic survey, 2008/09 MOF). It shows that in Nepal, agricultural sector is still traditional it employs a lot of people engaged in agriculture, so agricultural sector is dominant employer but its contribution in GDP is not largest.

Agricultural development is one of the important sectors of the total economy that influences the overall economic development of a country. Moreover agricultural contribution or its lack of contribution directly affects the overall rate of development and growth. Historical records show that no country has moved from chronic stagnation into the take-off stage of economic development without achieving substantial growth of agricultural production. In recognition of the increasing role, due priority is accorded to this sector in the national development plans.

But the question here is how to change the traditional farming practice of the Nepalese farmers, who have very small capacity to save as a result of the low level of income. The low income is the cause of low level of productivity due to lack of good investment in land and farming practices. Since farmer own funds are not sufficient for the purpose, credit becomes indispensable. Farmers must spend additional money on improved seeds, fertilizers and implements to increase production. This leads to the need of agricultural credit institutions as a means of making credit available to all the needy farmers to increase the production. The role of agricultural development over a long time in the past, private sector or the private sector or the private credit did not exist. Institutional agricultural financing was first started in the year 1954/55. In addition to private money lenders Nepalese farmers at present are conceived of getting agricultural credit from the ADB/N, and through the media of *sajha* at village level. The existence of various lending agencies does not guarantee adequate and effective supply of credit. Their credit policies are not

improved and properly managed to need of the poor helpless farmers. That is why adequate credit has not still been easily and timely available to all the farmers who are imediate need or it.

There should be some media on the village level to canalize credit farmers. In this background, economically variable co-operative societies should be the best institutions to private agricultural credit at the primarily level. All the co-operative organizations do not run successfully. The government should help run them. Nepalese farmers are below subsistence level. This is really critical situation and urges all of us to think over it seriously. To our mind farmers should be supervised very closely among with the provision of necessary inputs. The government should heavily subsidies the lending institution which handle the responsibility of possibility of providing their financial requirements are fulfilled by the institution agencies through a system of supervised credit and servicing loans.

As agricultural is characterized by capital hungry industry and relatively slow turnover in the dearth of capital will, be increasingly felt as time goes on. If the provisions of timely credit is provided to the farmers output can be increased. The amount of credit extended have a significant being agricultural development will certainly call for the use of more credit. The survival of agricultural economy is the future will depend mainly upon whether the farmers will have sufficient credit are co-related in Nepal. It is because the general farmers are so poor that they are not able to provide sufficient finance for scientific methods of cultivation.

Credit is needed in developing countries where there is the existence of traditional agricultural like ours agricultural credit, factor playing an important role in agro-production, has received continuity. ADB/L extended a credit of Rs18.53 billion in FY 2007/08. The Bank recovered Rs17.46 billion while its areas in the some fiscal year stood at Rs.71 billion. During the first eight months of FY 2007/08, Rs10.38 billion was extended as credit while, during the same period in FY 2008/09, the credit amount increased by 14.1 percent to Rs11.84 billion. Generally the farmers of traditional agriculture feel that it is bad to be in debt, so they do not borrow. But prohibiting credit is much core harmful to them then to accept it. As we have already stated that Nepalese agriculture is backward and of traditional type, peasants are mostly poor and illiterate. They have no sufficient credit facilities due to their small

scale business to improve farming. Monsoon still plays a vital role in determining prosperity. The small size of large number of holding, low level of income of the subsistence sector, uncertainty of returns in terrace farming in the hilly regions and debtness among farmers have all further complicated the problems of agricultural sector in Nepal.

“Agricultural countries are generally found to be far from development not because they are agricultural but because their agriculture is backward” (Viner 1953). In Nepal, on hand agriculture is backward and on the other hand agricultural productivity and income of the farmer is very low. Agricultural area particularly rural sector have been facing serious problems of accessibility for input, supply of market as well. Right from the production to marketing, farming have been hindered always. The government has taken a number of measures to raise agricultural sector. To put increase emphasis on agricultural development year 1975 was celebrated as the Agricultural year. As soon as planned development started agricultural sector was given much attention, since third five –year plan (1965-1970) agricultural sector was accorded top priority. Long-term agricultural prospective plan 1995-2015 (APP) has been adopted as a basis of poverty alleviation through agricultural sector development, which is recognized as major thrust of ninth and tenth plan. The App envisages increase in the annual growth rate of agricultural production from 3 to 5 percent, agricultural per capita income to grow from 0.5 to 3.0 percent per capita food availability from 270 kg to 426kg (APP).

Even after higher budgetary allocation, Nepal's agricultural sector has not developed. It is mainly for subsistence Agricultural in Nepal is not agri-business. It is the means of livelihood to majority of the population. Restrictive rules continue to stymie its growth. In addition to it, lack of infrastructure, Limited access to modern technology and credit facility are other major problems smothering output. Agriculture in Nepal heavily depends on rainfall (only 44 percent land has Irrigational facility). There are often critical variations in rainfall within limited geographic areas. Rainfall is not uniform even within the Terai. It is only the total amount of rainfall but also the length of the rainy season and its distribution which sets limits to the crops that can be grown. Most of rainfall occurs between mid-June and mid-September, which divides the year into short rainy season and long dry season. Even within this

given agricultural season, there is little probability that enough and timely rain will be available to germinate seed and ensure the survival of seedlings. Hence the expansion of irrigation facilities is essential. But out of total arable land 26, 41,000 only 17, 66,000 hectares of the land is estimated as potential for irrigation. Only 44 percent i.e. 11,68, 144 hectares of land is found to have irrigational facility (Interim Plan, 2007-2010).

So, the transformation of backward and traditional agriculture in modern and progressive is an urgent task. This transformation will require a change in technology used in farm production change in technology means change in various types of inputs such as high yielding variety seeds chemical fertilizer pesticides and other modern tools. As in Nepal, farming consists small and marginal farmers, majority of farmer have to borrow if agricultural production is to be increased. Access to agricultural credit is vital for agricultural and rural development, “Due to peculiarities of agriculture, especially its incentives low returns, high rate of rent and limited scope fro employment, large number of cultivator cannot manage the needed finance without recourse of borrowing. One of the most important lesson of universal agrarian history is that the agriculturist must borrow due to the fact that his capital is locked up in his lands stocks for stimulating tempo of agricultural production it is necessary that the farmer must be provided with adequate and timely credit” (Sadhu and Singh 1988). If we are all concerned about increasing total agricultural output in the shorter time, we must provide credit first and foremost. This will enable them to buy more labor saving equipments, more seeds and fertilizers. Without credit such farmer will not be able to invest in on-farm irrigation facilities, nor in the cost- intensive new crop technology. Credit operation is also crucial for promoting enterprises and entrepreneurship in agricultural and rural business necessary to induce greater efforts of farming and to upgrade the incomes of the rural community.

1.4. Objectives of the Study

The general objective of the research is to evaluate the credit disbursement (ADB/N) and it impact on agricultural production.

The specific objectives of the research are as follows.

- ❖ To analyze the role of ADB/N as a source of agricultural credit.

- ❖ To examine the present programme and performance of ADB/N regarding agricultural credit.
- ❖ To analyze areas and duration of loan disbursement and collection.
- ❖ To find impact of Agricultural credit in agricultural production.

1.5. Organization of the study

The present study is organized in to five chapters which are given below.

Chapter I: Introduction

Chapter II: Review of literature

Chapter III: Research Methodology

Chapter IV: Presentation and Analysis of Data

Chapter V: Summary, Conclusions and Recommendation.

1.6 Limitations of the Study

Since the study is based on the secondary data collected from various concerned offices and no further attempt will be made to verify the quality of published data analysis will be limited information from the remote areas usually comes late and less accurate their progress may non be included in the published data. The study is confined to analysis of loan disbursement, collection and outstanding of ADB/N only. The study shows that impact of credit disbursement of ADB/N only.

CHAPTER -II

REVIEW OF LITERATURE

2.1 General Background

Agricultural sector is the foundation of economic development in Nepal where majority of the population (i.e 76 percent reported in economic survey 2007) is still, dependent on it for production, income and employment creation. Therefore, Nepalese economy is called agrarian. This sector has contributed significantly in the export trade of agro-products, industrialization process and labor market. In Nepal, agricultural sector is a pioneering sector of national development (Bista, 2008).

Since Nepal is agro-based country, majority of the people still rely on agricultural, which has remained the major source of employment and income. Agricultural contributes the largest share to the GDP obviously, the country cannot steer the trajectory of sustainable development in the absence of agricultural development. In the light of this undeniable fact, the agricultural is accorded the topmost priority in previous development plans. Agricultural Business promotion policy 2063(2006) has been executed aiming at fostering and global markets there by developing the strong foundation to make the agricultural practices more commercial and competitive. (Economic survey 2009).

2.2 Theoretical Concept

Theoretical concept provides the review of literature of books and articles which are related to the present study. The review of those literature is as follows.

William Murry says “credit it has been pointed out, makes it possible for hired men to become tenant, to become owners, moreover credit makes it possible for farmers to makes advantage of new machines goods, seeds, fertilizers live stock and laboure all of which enable the farmer to or gains and operate his farm on a more profitable basis (murry William G. “Agricultural finance principles and practice of farm credit” collegeiatic press inc 1964 (pp6).

Agricultural credit enhances productivity and promotes standard of living by breaking vicious cycle of poverty of small scale farmers (Adegeye and Ditto 1985) described

agricultural credit as the process of obtaining control over the use of money, goods and services in the present in exchange for a promise to repay at a future date.

The crucial role of credit in agricultural production and development can also be appraised from the perspective of the quantity of problems emanating from the lack of it. In modern farming business in Nepal provision of agricultural credit is not enough but efficient use of such credit has become an important factor in order to increase productivity. (Ogunfowora et al. 1972) reported that credit is not only needed for farming purposes, but also for family and consumption expenses; especially during the off season period. Credit has also been discovered to be a major constraint on the intensification of both large and small scale farming (von-prisckieks 1986). The absence of rural banks or their unwillingness to meet credit need of rural farmers largely account for the wide influence of informal lending institutions on agricultural production in the rural areas.

Agricultural credit is a tool to acquire the means of increasing agricultural production. It is the amount borrowed by the farmers for effect is a tool to increase production, raise the quality of what is produced or otherwise improve operations to make them profitable. ("Encyclopedia Britannica" vol1, 1969).

"Agricultural credit institutions take a variety of forms. Credit unions and commercial banks operating in rural areas. The primary function of these institutions is to advance credit to the agricultural sectors, in particular to small farmers although many of them also provide a number of other complementary services mentioned below" public and private Agricultural credit institutions and a description of the function," FAO, monthly Bulletin of Agricultural economic and statistics June 1975(pp9-10) But Dr H.K. Upadhaya in his article Rural credit in Nepal. The issues of co-existence of the informal sector may be more efficient than the formal sector in small credit transactions. This tends to suggest the need to recognize and make provision in the credit policies for the co-existence of the two sectors at a single time and space. Perhaps this also explains the continued dominance of the informal sector in rural lending especially among the smaller borrowers in selected rural areas have also supported this as majority of the small borrowers either showed preference to the informal sector or indifference between two sectors 'Upandhyay Dr. H.K. "Rural credit

in Nepal the issues of coexistence. Of formal and informal markets” Agricultural credit quarterly Journals vol. 27, June 1994, ATRI (pp68)

In the world of perfectly competitive market, households participate in all factor and commodity market when these factor are used in production and commodities are produced and/or consumed by the households, as long as factors and commodities are imperfect substitutes and distribution of factors commodities vary across households. But farm households are located in an environment characterized by a number of market failures for some of its products and for some of its factors (Sadoulet and de Janvry 1995). But agricultural credit markets work imperfectly even in countries with a developed market economy, focusing on problems related to asymmetric information, adverse selection, moral hazard, credit rationing, optimal debt instrument choice and initial wealth. It shows why these and related problems may cause transaction costs to be so high that credit rationing and high interest rates and rational and efficient responses by lenders to the imperfect information problems of the agricultural sector (©1999 Elsevier Science Ltd.) Hence market failure with reference to credit and its impact is the theoretical basis of this study.

Poor people are not getting credit easily. It means there is credit market failure

Credit Market failure

A frequent case of market failure is limited access to working capital credit (Sadoulet and de Janvry 1995). There are several reasons for credit market failure among which rationing out and transaction costs are most commonly pronounced.

Rationing

Poor households in developing countries, often with agriculture as a main source of income, cannot obtain as much credit as demanded and therefore remain tightly credit rationed by money lenders (Petrick 2005). Credit rationing refers to a situation in which lenders are unwilling to supply credit, even, if s/he is ready to pay higher interest rate than the prevailing market interest rate (Stiglitz and Weiss 1981).

While much of the literature (Conning, 1995, Kochhar, 1997; Mushinski, 1999). Concentrates on the determinants of access to formal loan program, here we are

primarily interested in how access to capital affects agricultural profits and investment. Some studies have measured the incidence of credit rationing and its effects. (e.g. Jappeli,1990, Feder et al.,1990 Barham et al., 1996). A few studies, notably work on loan programs by (Zeller et al. 2001). In Bangladesh and by (Diagne and Zeller, 2001) in Malawi; have succeeded in both quantifying the degree of credit rationing (i.e. how much the borrower was rationed by the lenders) and estimating its effects. (Zeller et al. 2001). Found that in Bangladesh credit access had a significant and strong effect on both income and food consumption. In contrast, Diagne and Zeller find that micro-finance institutions in Malawi had a negative impact on net farm income for participant. The results from Malawi suggest that interest rates may not be as important as loan program details, such as use restrictions, in determining the benefits of loan programs.

(e.g. Carter1989, Feder et al. 199) Suggests that credit rationing can cause a misallocation of resources in farm production. This misallocation of inputs can then cause the credit rationed farmer to have lower profit levels. Then his unconstrained neighbour. The lower profit levels investment levels and a misallocation of variables inputs. Although credit is often found to be a determining factor in profits and investment, multiple market failures outside of the credit market (e.g. labor or land markets or access to transportation) may overwhelm the effect of credit, as was found for example in malawi by (Diagne and Zeller 2001). While opportunity costs of capital are widely regarded to be high in developing countries, there is good reason to believe that the opportunity cost of capital to rural dwellers might be particularly high. (Bottomley 1975) illustrates the increase in average lending cost as loan volume and income of the borrower decrease. Failure of formal financial intermediaries to reach small borrowers with credit services has been documented by Bourne and Graham (1989), (Von pische1984) and (Lanson et al 1994).

To understand why credit rationing occurs, remember that the aim of the lender is to maximize his expected profit. Thus, lender will only raise interest rates if they lead to increased expected profits. Yet expected profits are not only dependent upon interest payments but also on the probability of default. Increased interest rates will lead to higher promised returns, but may also increase the probability of default. If the latter is large enough it can lead to decreased expected profits. Thus it is often in the best

interests of the banks, not to raise interest rates, but to limit the amount of available credit. (Stiglitz and Weiss, 1981; Demeza and Webb, 1992).

Two further problems of markets with asymmetric information are adverse selection and moral hazard. Adverse selection occurs in financial markets, when potential borrowers most likely to produce an undesirable (adverse) outcome (ie the bad credit risk) are those who most actively seek loans, and are therefore most likely to be selected, as lenders may not know the borrower or only some of his characteristics since adverse selection markets it more likely that loans might be made to bad credit risk, lenders may decide not to allocate any loan even though there are good credit risks in the marketplace. The access to credit is rationed, thus the credit allocation process is no longer efficient within the market. As a result, even agricultural producers with economically viable ('good') projects may not obtain the loans they need to invest for a particular activity (Myers and Majluf, 1994; De Meza and Webb, 1987, 1992; Stiglitz, 1994).

More hazard in financial markets occur when the lender is subjected to the hazard that the borrower has an incentive to engage in activities that are undesirable from the lender's point of view. If the borrower does not have enough incentives to manage the capital resources as well as possible for which a loan is granted, this may lead to an increase in the risk of the borrower's ability to repay the loan. These are respectively called the moral hazard of the choice of effort and choice of purpose. Depending on the lender's capability to monitor the borrower's activities, credit rationing may result (Harris and Raviv, 1979; Dowd, 1992; Stiglitz, 1994).

Informal money lender is another option for poor people to get credit. There are several reasons behind the attraction towards informal money lender (Ray 1998). First they can accept the collateral in the forms which is not acceptable to formal money lenders e.g. labour, small plot of land etc. Second informal money lender have much better information regarding the activities and characteristics of his clientele. Although there is dominance of informal money lenders even in the country where government has put much effort for rural finance (eg. Nepal) due to above mentioned reasons, this sector also ration out the borrowers due to the same reason i.e. possibility of default and informational asymmetries.

(Kocher, 1991) has shown that informal sector's supply schedule for the credit is upward sloping and depends on the rate of interest and household characteristic of borrower's characteristics varying the interest rate for each borrower. Hence a risky borrower faces high interest rate reflecting significant screening and monitoring costs lenders have to bear in such cases (Kocher 1997). This upward sloping supply schedule implies that a household is not free to borrow as much as it wants in given interest rate (Kocher 1997) indicating credit rationing.

Transaction Cost

Transaction cost is another important factor to fail credit market. Interest to be paid for credit is the direct cost of credit. However there are several other costs to be born by borrower for obtaining credit. Examples of such other costs are transportation cost, legal fees, accounting cost, opportunity cost etc. (Adams 1994) Transaction cost is 'explicit and implicit spending made by the participants in financial transactions, excluding the payments for interest rate, the cost of resources, and cost of potential credit losses. The effect of transaction cost is that it increases the actual cost of borrowing. It is possible that higher transaction cost either restricts borrowers to participate in the credit market or compels them to borrow less than desired (Rojas and Rojas 1997).

An important intertemporal issue related to credit markets is that of short-term versus. Borrowers usually prefer longer-term debt contracts due to the liquidity effects they implicitly provide, whereas the use of short-term debt contracts will repeatedly confront the borrower with the risks of credit rationing, increased interest rates, and further transaction costs. The lenders' willingness to provide long-term contracts, however, depends directly on the durability to observe the borrower, thereby minimizing the adverse projects selection problem, before the renewal of the debt contract. Short-term debt also enables a borrower with private information about the project to signal the 'good' information to the lender, and at the same time, it exposes a borrower with 'bad' information forcing him to reveal his risk to the lender (Dowd, 1992). Additionally, the use of short-term funds increases the lenders liquidity and reduces agency problems. Having to continually return for credit restricts the borrower's ability to slack off or otherwise benefit through diversion of excess funds (Jensen, 1986; Hart and Moore, 1993). The continual rolling over and renewal of debt

also forces the borrower to provide the lender with additional useful information, reducing many of the asymmetric information problems discussed above (change, 1990). Thus the optimal debt maturity structure is trade-off between many conflicting factors and agency costs, with even 'good' borrowers tending towards longer contracts due to liquidity constraints and transaction costs (Dowd, 1992).

The concept, nature and role of 'credit' is quite different. In a planned economy versus a market economy. In a market economy, the main monetary policy instrument is the control of the total money supply, leaving the allocation of credit inside the economy largely to independent financial returns. In centrally planned economies, the main monetary policy instrument was the credit allocation. A financial plan ensured the realization of physical target, as expressed in the state plan. The plan specified quotas for working capital, long-term loans for financing investment and public money holdings. Credit was provided through the central bank to farmers for these investment, typically with a negative real interest rate, not based on merit and often used as a way to support unsuccessful enterprises (Mckinnon, 1990, Beljer and sagari, 1991). Credit was less a monetary than an accounting instrument. This different role of credit is a factor in explaining agricultural produces; strong insistence on preferential credits, i.e. credit at low nominal interest rates: why does one need to pay for using an 'accounting mechanism'? Therefore addressing the 'credit issue' includes, besides the economic allocation problems, a psychological/educational factor in explaining the role of credit in an economy, and that the use of credit has price, ie the interest rate. The attitude towards trading and marketing is very different under both systems. While marketing and trading are considered vital elements of a well functioning market system, traders ('speculators') are often blamed for increasing prices and reaping profit on the back 'producers' without producing anything for the economy. (Galbraith 1987). In many instances, these initiatives have been successful in reducing the asymmetric information problems and lowering the transaction costs without interfering with the actual market allocation mechanisms.

These credit markets imply that inherited endowments are central to the ability of farmers to acquire productive assets out of equity and to engage in additional borrowing for investments and working capital (Holden and Binswanger).

Effect of Credit Market Failure in Agricultural Production

In the agriculture production there is time lag between planting seed and harvesting crops. Credit helps to bridge this gap between planting and harvesting. In the beginning of production, a farmer has to decide how much resource is to allocate for consumption and how much for production as liquidity is an acute problem in the rural area especially where agricultural is the major occupation. In the situation of perfectly competitive market a farmer can get credit what ever he demands in the existing market rate of interest. So there is no problem for achieving efficiencies (allocative and technical) and consumption and production decision are separable. In this case the levels on inputs in production and investment will not be affected by the level of credit they receive.

In the situation of credit market failure there is limited access to credit for farmer and budget balance becomes a constraint to him. The total of the consumption and production expenditure should be less or equal to the total revenue comprised with accumulated saving and credit. Hence a credit constraints limits the optimum production or consumption purchased input e.g. fertilizer, as the decision price of input is marketed up positively by shadow value of credit leading to reduce agriculture output.

A substantial amount of adoption literature has reported on the impact of access to credit on adoption, and a good deal of it showing that credit has a positive impact on adoption. Feder and Umail (1993) and Cornejo and McBrid (2002) review factor that affect technology adoption and they highlight access to credit as a key determinant of adoption of most agricultural innovations. Nevertheless, most studies that have looked at the impact of credit have generalized their analysis by assuming that credit access should always lead to positive impact outcomes. Such studies have ignored household behavior with regards to whether or not the household is credit constrained. In reality however, there are circumstances in which access to credit may have no impact on household welfare. Credit access will only be effective for the credit “constrained”- thus those with access to remunerative consumption, production and investment opportunities who are unable to pursue the opportunities for lack of financial resources.

A lack of access to credit may not necessarily imply an unmet credit need (de Janvery et al 1997). In the same way, the marginal contribution of credit is likely to be high in households that have a larger binding credit constraint than in those that less constrained, considering separability in production decision models is important because the comparative statics for households facing a market failure such as credit constraints are different from those without a market failure, such that model that do not take into account such differences will lead to inconsistent parameter estimates (Vakis et al; 2004).

2.3 Theoretical Model

Static household models that stress the role of pervasive risks, limited information and imperfect markets on household's behavior have been widely used. Singh et. al. (1986) note that predictions derived from these models differ markedly from those under a standard household model where separability between production and consumption decisions is assumed. Under separability, allocation of resources in production can be decided independently of consumption decisions. However separability breaks down when there is a market failure such that production and consumption decisions need to be taken jointly. In agricultural production, expenditure and income profiles are markedly seasonal and thus the liquidity constraints in financing production and consumption can be particularly acute (de Janvery et. al., 1999). This prompts households to adjust their income generating strategies and their expenditure patterns to bring the distance between the two profiles within the range of available credit.

Thus in this study we assume a static household model that links adoption of improved technologies with a growing season liquidity constraint. It is assumed that a household chooses between growing food crop types (F_c) that is not subject to the growing season liquidity constraint and cash-crop (C_c) which is subject to the growing season liquidity constraint. The household is assumed to be maximizing the following utility function.

$$\text{Max } Q_{cc}, L_f L_{cc}, Q_{x C_c}, C_{cc} C_{fc}, C_c, C_f U(C_{cc}, C_{fc}, C_f, C_c, z^h) \text{ ----- (i)}$$

Where,

U is the utility function to be maximized,

C_{cc} , C_{fc} , C_c and C_f are quantities consumed of cash crop, food crop, manufactured goods, and leisure, respectively.

z^h is a set of household characteristics that influence consumption.

Subject to $P_{x_{cc}} Q_{x_{cc}} + P_c C_c + P_{cc} C_{cc} + P_{fc} C_{fc} = P_{cc} Q_{cc} + P_{fc} Q_{fc} + w(L_s) + K$ ---(2) seasonal liquidity constraint.

$g(q_{cc}, q_{fc}, l_{fc}, l_{cc}, q_{x_{cc}}, z^q) = 0$ production function.

$L_s + L_{fc} + L_{cc} + c_1 = E$ time constraint.

q_{cc} , q_{fc} are quantities of cash crop and food crop produced, respectively.

L_{fc} , L_{cc} and L_s are quantities of labor used in the productions of food crop, cash crop and labor sold out by the household, respectively.

$q_{x_{cc}}$ is the quantity of extra inputs required for the production of cash crop, such as improved seed, pesticides etc.

z^q is a set of fixed factors in production and farm household specific characteristics that influence production,

$P_{x_{cc}}$ and w are input price for inputs specific to cash crop and wage rate on the labor market, respectively, P_{cc} and P_{fc} are farmgate prices for cash crop and food crop.

P_{cc} is the price for the manufactured goods.

E is the total time endowment.

K is the liquidity farm past saving, credit, and per-harvest transfers.

In the present economies with rate opportunities for off farm income, maximizing the consumption function is closely associated with maximizing farm profit which are then used to finance the consumption decisions. In this case it means maximizing profits from the production of cash crop and food crop. The maximization problem above yields the following lagrangean function

$$L = U(C_{cc}, C_{fc}, C_c, c_f; z^h) + \lambda [P_{cc}Q_{cc} + P_{fc}Q_{fc} + w(L_s) + k - P_{xcc}Q_{xcc} - P_c C_c - P_{cc}C_{cc} - P_{fc}C_{fc}] + \lambda 2[g(Q_{cc}, Q_{fc}, L_{fc}, L_{cc}, Q_{xcc};)z^q] + \lambda 3[E - L_s - L_{fc} - L_{cc} - c_s] \text{ -----(3)}$$

Assuming an interior solution, the maximization problems yields the following first order conditions.

$$\frac{\partial L}{\partial C_{cc}} = U_{cc} - \lambda_1 P_{cc} = 0 \text{ -----(4)}$$

$$\frac{\partial L}{\partial C_{fc}} = U_{fc} - \lambda_1 P_{fc} = 0 \text{ -----(5)}$$

$$\frac{\partial L}{\partial C_c} = U_c - P_c = 0 \text{ -----(6)}$$

$$\frac{\partial L}{\partial c_f} = U_{cf} - \lambda_3 = 0 \text{ -----(7)}$$

$$\frac{\partial L}{\partial Q_{xcc}} = \lambda_2 Q_{xcc} - P_{xcc} (1 + \lambda_1) = 0, \lambda_i \geq 0 \text{ -----(8)}$$

$$\frac{\partial L}{\partial L_{cc}} = \lambda_2 L_{cc} - \lambda_3 = 0 \text{ -----(9)}$$

$$\frac{\partial L}{\partial L_{fc}} = \lambda_2 L_{fc} - \lambda_c = 0 \text{ -----(10)}$$

λ is a multiplier associated with the credit constraint. The multiplier represents an additional amount of inputs for the production of cash crop (Q_{xcc}) that a farmer will purchase for each additional unit of cash or credit. This is valid only when the farmer fails to acquire optimum inputs required due to lack of cash. Thus it is only relevant to credit or liquidity constrained household. For unconstrained households the multiplier does not have an effect on their production decision. There are therefore, two scenarios depending on whether the credit constraint is binding or not. First, we consider a case where the household can borrow. Thus the credit constraint is not

binding and therefore, - under this scenario, the first order condition for the optimum input requirements are given as follows.

$$\frac{\partial L}{\partial Q_{xcc}} = \lambda_2 Q_{xcc} - P_{xcc} = 0 \text{-----} (11)$$

The optimum quantity of input – is given by

$$Q_{xcc}^U = Q_{xcc}^U(P_{cc}, P_{fc}, P_{xcc}, Z^q, E) \text{-----} (12)$$

The superscript U refers to the unconstrained case.

In the second scenario we have a household that can not borrow as much as it wants. The household is said to face a credit constraint ($\lambda_1 > 0$). The first order Kuhn Tucker conditions under such a scenario are still based on the same as is exogenously determined by the lender. The first order conditions for the interior solution are

$$\frac{\partial L}{\partial Q_{xcc}} = \lambda_2 Q_{xcc} - P_{xcc} (1 + \lambda_1) = 0 \lambda_1 > 0 \text{-----} (13)$$

Since the constraint is binding we must solve the optimum quantities of Q_{xcc} and $-\lambda_1$ as follows

$$Q_{xccc} = Q_{xccc}(P_{cc}, P_{fc}, P_{xcc}, Z^q, E, K) \text{-----} (14)$$

The superscript c refers to the constrained case.

The difference between the two (constrained and unconstrained) is that in the constrained case farmers are unable to buy optimal quantities of cash crop input Q_{xcc} . The amount of credit therefore becomes an important determinant of the farmer's ability to adopt cash crop. The amount demanded for cash crop input does not only depend on the prices of crop and/or their inputs but also on the amount of credit (k) available to the household.

The hypothesis to be empirically tested is that while access to credit (k) does not influence the adoption decision for the liquidity unconstrained farmers, it does so for the constrained.

2.4 Empirical Study

In empirical study reports from different research agencies are reviewed which are as follows:

The farming systems of the western hills of Nepal are complex, varying with the diverse physical biological and economic conditions found in the area and farming households are risk averse. Agricultural production is determined by a combination of altitude (400-3500 m) rainfall (1500-5000 mm pa) and slope aspect. Climate varies from subtropical to alpine within tens of kilometers and the range of possible crops and other farm enterprises reflects this variability. Interdependence of three components of crops, livestock and forest is characteristic of the farming system with the forest as the resource base upon which crops and livestock production are sustained. Individual farm holdings are small (< 1 ha) and although household size is large (typically 5-7) members, seasonal or permanent migration and increased school attendance means that labour is in short supply.

Agricultural production is primarily for household consumption although typically only 20 percent of households in the area are self-sufficient in the production of staple grains. The farming system and socio-economic conditions are stratified by ethnic group. The Brahmin/Chhetri group predominates in the low land middle hills and traditionally depends primarily for their livelihood on agricultural production. The Gurung/ Magar groups predominate in the high hills and livelihood dependency is mixed, although agricultural is important, remitted earning. From male household member are dominant in many households occupational castes are found throughout the area, their livelihoods are artisanal based (e.g. metal- or leather- working) and households have no, or very small, land holdings.

Since 1975, LARC had been funded directly by the overseas Development Administration how the Department for international Development of the British Government through a bi-lateral aid programmed. In 1992 ODA commissioned impact studies to assess the economic and to identify the lessons to be learnt for providing effective research and extension in the hills of Nepal and in similar environments. The first study, the extension impact study (EIS) was conducted in the winter of 1993/1994. It found that a favorable impact (i.e. One that was beneficial for

farmers and cost effective) had been achieved, although the distribution of benefits had been skewed towards the relatively resource-rich farmers (LARC) 1994). The second complementary study, a Research impact and management study (RIMS) was conducted in the winter of 1994/199 (MASDAR;1995a,b). One component of the RIMS was an Adoption study designed to

- ❖ Determine the level and extent of adoption of selected agricultural technologies in which LARC has been substantially involved in developing and/or disseminating,
- ❖ Determine the reasons for and factors influencing the distribution of adoption by important physical and socio-economic factors, and
- ❖ Identify lessons for the future conduct of research and of research and extension linkages.

Although adoption and impact studies as a means of evaluating research and extension programmes are well established (CIMMYT, 1993; Horton et al, 1993) and widely reported, with few exceptions these studies have concentrated on individual technologies. Where farmers integrate crop, horticulture, live stocks and forest production for their livelihoods, as they do in the hills of Nepal households are potential adopters any number and combination of the technologies for any or all of these production systems. Analysis and presentation of results by individual technologies, while useful in identifying factors and effects related to the individual technologies, is therefore limited in its ability to identify and describe the effects of, and the factors affecting, adoption at the household level-in addition few studies have allowed technology adoption to be related to impacts perceived by the adopters, a limitation that derives partly from the scope and partly from the methods used in the studies.

Traditionally, cropping systems in Nepal are tightly coupled with livestock production. With resources for both of these being drawn from the forest (Carson, 1992; Kift et al, 1995). Maiz- based cropping systems provide both grain for domestic consumption and organic material, either as green thinning between emergence and flowering, or as Stover after harvest, for animal feed (Ransom and Rajbhandari, 2000). The manure or composted plant material is returned to the field. Pilbeam et al.

(2000) note that sustainable production within the household, in the mid-hills of Nepal has been achieved by exploiting the nutrient base outside of the household, particularly from the forest (Schreier et al. 1994). Found that nutrient content of soil from agriculture land was greater than that of soil under forest, suggesting a net movement of N from non-agricultural land to agricultural land. Whether such practices are sustainable in the long term is unclear, let alone whether a four-fold increase in productivity can be achieved (Turtn et al 199), reporting the results of a survey of households conducted in 28 villages in nine districts in the western Region of Nepal indicate that a majority of farmers felt that their soil fertility was declining similar findings were reported by (Mathema et al. 1999) from a survey of households conducted during 1999 in both the western and Eaten regions of Nepal. It is possible, therefore, that current practices are unsustainable and that crop yields may decline with a consequently detrimental impact on the viability of rural communities. On the other hand, the use of artificial fertilizers, particularly area, is on the increase, although this has led to the abandonment of traditional methods of soil fertility maintenance in some cases, and moreover, the initial yield increases have not always been maintained (Sherchan et. al. 1999). Thus, questions are arising as to the best was to combine organic and inorganic sources of nutrients into integrated nutrient management systems so that crop yields can be maintained at a satisfactory level without resulting in soil fertility decline. These some questions also have relevance at a global level, as there is increasing interest in agricultural management strategies that can help off set the detrimental effect of anthropomorphic emissions of into the atmosphere by enhancing sequestration of into soil organic mater.

In recent years, attempts to evaluate the sustain ability of agricultural systems in Nepal have been made using nutrient balance approaches to quantity the nutrient fluxes into, within, and out of fields, farms and households (e.g. Brown et al. 1999 pilbeam et. al; 2000), and have concluded marginal sustainability or declines in soil fertility depending on the cropping system considered. However, these studies generally construct nutrient balances on an annual basis, and therefore, do not and cannot, considered. However, the dynamic processes and feedbacks involved between soil fertility and crop production. Calculated nutrient deficits (Brown et al, 1999), for example, may be transitory with crop yields falling to a lower equilibrium over several years to reach a new balance of inputs and outputs. Historically, one approach

to examining the level of productivity and sustainability of particular cropping systems has been to establish and maintain field experiments with crops receiving different types and rates of nutrient inputs. The long term cropping experiments (-140 years) on Hoosfield and Broad balk at Rothamsted Experimental station, UK (Powlson and Johnston, 1994), are classic examples for temperate agricultural. These have been replicated in some tropical agricultural systems, but usually over considerably shorter time periods (e.g. Djokoto and Stephens, 1961). Such trials provide the basis for developing robust recommendations for sustainable cropping systems, but they have a number of drawbacks, namely, they are resource intensive, location specific, and deliver relevant results only slowly. Specifically, apart from an eight-years study by (Sherchan et al. 1999), there are few data from long term Maize-based field experiments conducted in the mid-hill or Nepal from which recommendations for appropriate levels of nutrient input for sustainable yields can be developed.

An alternative approach, which can address each of these deficiencies, is to use detailed but robust simulation models that accurately reflect the physical, chemical and biological processes that underpin the cropping system. A model that has been effectively and adequately reflect the be used to test different scenarios and to develop appropriate recommendations based on knowledge of the likely impact of different types and rates of nutrient inputs in a previous paper (Matthews, 2006), the development of the PLAM model, which is able to simulate the growth and development of a number of crops, along with soil, water, carbon and nitrogen dynamics for a number of fields, was described. The objective of this paper, therefore, are:

- (i) To validate the PALM model for maize-based cropping systems in the mid-hills of Nepal by examining how it predicts particular crops and soil processes against field data;
- (ii) To evaluate the sustainability and productivity of seven different N treatments applied to a series of maize-millet field trials (Pilbeam et al; 2002);and

- (iii) To develop recommendations for the rate and type of N inputs to maize-based systems required for sustainable cropping in the mid-hills of Nepal. Agricultural plays a vital role in Nepal and main occupation is agricultural. But the condition of agricultural will be favourable only when modern method is applied in cultivation. (Jha k.k “Agricultural finance in Nepal “ BR Chawla, first edition 1978).

Due to some characteristics of agricultural, agricultural credit is affected and high risk is involved in agricultural credit than in other type of credit they are:

- (i) Complex nature of agricultural than other industries
- (ii) Uncertainty in agricultural
- (iii) Long interval between efforts and rewards
- (iv) Absence of tangible security other than land
- (v) Need credit for consumption requirement.

Hence everyday to give credit to sector other than agricultural, consequently less credit is available for this sector and interest rates is high. There are various sources of agricultural credit Broadly, these various sources of agricultural credit may be divided into.

1. Traditional or private lender
2. Institution

Traditional or private sources of credit include informal sector which is major suppliers of agricultural credit even now. It is found that at most 18 percent of the farm families have access to institutional credit and not more than 85 percent of aggregate credit needs of agriculture and agro-based activities are met by the formal sector. The main supplier of traditional credit are as follows

- a. Money lender
- b. Landlord and sahu mahajan

c. Merchant

d. Friends and Relatives.

Beside these, there are some tradition and cultural of voluntary cooperation activities in our society. They are

a) Manak Guthi b) Parma c) Dharma Bhakari d) Dhikuri.

Institution sources of credit include commercial Bank, Development Bank, finance companies cooperation etc. According to survey carried out by research agencies credit from informal market pay interest rates varying from 36 percent to 50 percent per annum. Sometimes the loan amounts to even more than the market price of product that loan was borrowed for unproductive borrowing exorbitant rate of interest as well as the formals own low income make them increasingly unable to repay the loan. The sink deeper in to debt as the years go by. This led farmer to loose their collateral for a very low price and transfer of land to creditor.' The outcome of high in debt ness was not only the loss of land for the actual tiller but also resulted in large scale emigration of people from one part of the country to another and also outside the country, especially to India” (Jha 1978)

The Agricultural Development Bank Limited (ADBL) started the small farmers Development program (SFDP) in 1975 to extend credit to small and marginal farmers. Under SFDP, small and marginal farmers were organized into groups of 5-7 individuals to borrow from ADBL based on the group guarantee. SFDP was carried out through its sub-project office (SOP) which promoted village level committees and was facilitated by a group organizer. Groups were formed based on the community members common socio economic status, such as having income below the poverty threshold, being from a common locality, and having citizenship certificates separate male and female groups were organized. Loans under SFDP were subject to the ceiling of NRs.30,000 per individual group member. Loans generally started at lower levels, with member graduating to large loans based on experience and satisfactory repayment performance. In addition to the financial operations to support SFDP, ADBL has assumed responsibility for group mobilization and group training.

Main goal of the bank is to develop the agricultural sector by providing loan facilities and also, increase the agricultural productivity that is turn, bring an improvement in the standard of the farmers. To achieve the goal, the borrower should be given the top most priority and importance to the servicing, supervision and collection of loan. The loan derived from the ADB/N should be sufficient. If the farmers utilize the loan properly for which it is borrowed, they should be able to repay the loan and to obtain a surplus after meeting their all necessities.

Agricultural Development Bank provides the following categorized loan structure.

- ❖ Short term loan structure
- ❖ Short term production loan.
- ❖ Short term marketing and storage loan.
- ❖ Medium term loan.
- ❖ Long term loan.

Table No.2.1: Categorization of Loan by Agriculture Development Bank in Nepal

S.N.	Category of loan	Duration	Purpose	Rate
1	Short term production loan	Up to 8 month	For the seasonal requirement of raising crops, livestock, diary poultry other farm inputs that is seed, fertilizer, insecticides, fodder and cattle fee fish and farm equipment.	10-16
2	Short term marketing and storage loan	Up to 12 month	For the marketing of agricultural products an for transportation and storage facilities.	15
3	Medium term loan	Up to 7 years	For the creation of facilities such as tube well, irrigation pump sets tractors, power tiller draught animals, diary and poultry and other farm machinery and other agricultural equipment.	12-15

4	Long term loan	7 to 20 years	For the improvement of land, constructions of agricultural buildings storages and ware house facilities, installation rice mill, agro processing units, tea plantation and horticulture of chard and processing of horticultural products.	12-16
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Source: Annual Report, ADB/N

Agricultural Development Bank and has designed the certain criteria to provide the loan for the applicant, as, follows.

- ❖ The loan applicant must have a Nepalese citizenship of legal age.
- ❖ If the loan applicant is a co-operative body, it must be registered to the appropriate authorized government institutions.
- ❖ The applicant must have the required knowledge, skill and experience for the operation of project for which he is borrowing loans.
- ❖ The applicant must have repaid the previous loan at due date and if he want to be a new applicants for loan, he must be intended to repay the loan at identified date.
- ❖ The applicant must be capable of meeting the counterpart contribution to the project cost as required under policies and procedure of ADB/N.
- ❖ According to the lending rules of ADB/N, the borrowers have to finance some percentage from their own source to that scheme. The minimum rate of the borrower's contribution is 10 percent to 15 percent or the total capital requirement for the scheme for medium and long term loan respectively. But such rule is not applicable to the village committees and cooperatives and also to the borrowers who are suffered by the natural calamities.

On the basis of above factors, Agricultural Development Bank provides the loan for the applicant's

Farmers could not obtain their capital requirements from their own saving, so each farmer need loans to finance their felt needs such as

- a. To buy production supplies,
- b. To pay rents wages and other expenses for production;
- c. To provide subsistence for the family,
- d. To purchase tools and small equipments,
- e. To diversify farming practices,
- f. To improve, development or add farm.

Individual farmers willing to borrow loan, must be well-informed about his lender's policies, procedure and other lending conditions in order to act accordingly. The borrower should fill up the précised loan application from supplied by the bank. The application from should be accompanied with the supporting documents such as certificates of rent payment, if is a tenant.

In case, where loans are to be disbursed in cash, is taken so that loans may not be miss-utilized. For such purposes, loans are disbursed in installments. The second installment of the loan is released only when the Bank finds the proper utilization of first installment.

Following resounding success in the pilot sites of SFDP, the number of groups has multiplied rapidly since 1980. Some aid agencies, including the Asian development Bank, funded SFDP on a large scale. However as the number of spas increased rapidly in all the districts of the country reaching 452 by 1990- the performance of SFDP progressively deteriorated due to (i) mounting political interference, (ii) soaring overhead costs, (iii) ineffective loan appraisal and portfolio management (iv) deliberate default and (v) rapid and alarming decline in recovery rates. The supply of aid agency funds encouraged ADBL to pass down inflated loan disbursement targets to spas. As a result, lending accelerated and become more indiscriminate, leading to even more widespread defaults the aid agencies stopped funding SFDP due to its

worsening performance, and started channeling funds to non-government organizations.

2.5 Concluding Remarks

under the review of literature different scholars have clearly emphasized the impact of agricultural credit in agriculture production of developing economy both theoretical and empirical work in economics has established that credit markets in developing countries work inefficiently due to a number of market imperfections. The literature cites a number of market imperfections which lead some potential borrowers to be rationed out of the credit market. These Imperfections Include.

- ❖ Interest rates ceiling usually imposed by the government.
- ❖ Monopoly power in credit markets often exercised by informal lenders (Bell et al; 1997).
- ❖ Large transaction costs incurred by borrowers in applying for loans; and
- ❖ Moral hazard problems (carter, 1988). In many cases a number of these imperfections combine to ration farmer out of the loan market.

Lumle Agricultural research center (LARC) show that a positive and significant relationship between enhanced extension input to farming household and the wider beneficial impacts perceived by the households, as a result of the adoption of the technologies . Benefits were skewed towards a small proportion of households more favored by extension input and household resources base 2003 Elsevier science Ltd. All rights reserved. Although Agriculture credit has been in high demand, it has had little impact in increasing agricultural production for individual users in the survey area. The impact of credit on farmer's net income was evens less. The increase in production was not always followed by income improvement, as the additional income associated with applying credits was sometimes compensated by extra costs. To some extent, agricultural credit enabled farmers to implement better husbandry practices, through applying more agricultural inputs (seeds, fertilizers, pesticides, crop maintenance and through timely husbandry application. About half of the farmers

reported that credit did not help. The other half of farmer experienced a small positive impact of agriculture credit in agriculture production. on Nepalese agro products. So the present study amines to explore and analysis these things which are not found in the reviewed literature.

CHAPTER -III

RESEARCH METHODOLOGY

Present the methodology of this study. This specific objective of this study, research problems associated hypothesis and characteristics of the sample determined the choice of the sample design and tools of analysis as they are presented here.

3.1 Research Design

The study based on published secondary sources of data and information. The research design according to the targeted study focus. In this study, different techniques such as qualitative as well as quantitative data have been employed to achieve the above stated objectives. Quantitative techniques such as percentage, ratio, mean, standard deviation, regression equations and other measurable techniques are used. This study is based on certain research techniques consisting of simple regression analysis, tabular analysis and graphical analysis. Secondary data are used for the purpose of analysis. The major variables are Agricultural credit Disbursement, Collection and Total Outstanding of ADB/N. being a social research based on time series data, experiment is not allowed by the very nature of study.

3.2 Sources of Data

The analysis is based on the time series data of 15 years covering the period between 1993/94 to 2007/08. Hence rationale for selecting this period is that after the establishment of multiparty democracy system government has provided the Agricultural credit in Agricultural sector are very poor. This thesis mainly deals why after the multiparty democracy system there is low economic growth.

This study is based on secondary data published by from Agricultural development Bank report and other organization. However, some informal Interviews and interactions have been done with respective experts, for the primary sources. Secondary information of data has been collected from the following sources.

- ❖ Documents and publications about various five year plan National planning commission.
- ❖ Statistical pocket books of various years- by CBS.

- ❖ Annual report of ADB/N Ramshapath, Kathamandu
- ❖ Economic survey fiscal years 2008/09.
- ❖ Ministry of Agriculture and co-operative.
- ❖ Nepal Rastra Bank (NRB).
- ❖ Central library Tribhuvan University

3.3 Method of Data Analysis

The major objective of this study is to evaluate the credit disbursement and its impact on agricultural production. During the analysis of data for the study, some multiple regression and Cobb-Douglas production tools are used to interpret the result. Instead, to make the study as practical as possible, obscuration and the impact on agricultural credit on the society due to policy change have been seriously focused. This led the study towards the time series analysis of 15 years.

Quantitative as well as qualitative methods have been used to analyze the data. However, use of quantitative tools has been employed widely. Tabulation of data and graphical presentation of the data are made to make the information visible as well as understandable easily.

Hence, use of quantitative tools is the best method to analyze data and also to reach the conclusion. Different statistical tools for both estimation and test have been employed as demanded by the objectives which are mentioned earlier. In general, following models of analysis are used.

3.3.1 Regression Equation

Regression analysis is the technique for studying how the variations in one series are related to variations in another series. In this study, multiple regression analysis shows how total agricultural output, irrigation cultivated land, and credit disbursement are related.

Multiple regression analysis is a mathematical measure of the average relationship between total agricultural output, irrigation facilities, cultivated land, credit

disbursement in terms of the original units of data. It also helps to found out total agricultural output related in irrigation, cultivated land and credit disbursement.

For the purpose of calculating regression equation of total agricultural output, irrigation facilities, cultivated land and credit disbursement and by let us denote by y , x_1 , x_2 , x_3 respectively.

The regression equation is

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 \dots \dots \dots (1)$$

Where, $a > 0$ is the constant and

b_1x_1 = Irrigation facilities in area heacter.

b_2x_2 = Cultivated land in area thousand hacter.

b_3x_3 = Credit disbursement by agricultural development bank in million

Y = Total agricultural output in million

them the regression equation (i) reduce to

$$Y = b_1x_1 + b_2x_2 + b_3x_3 \dots \dots \dots (ja) \text{ let}$$

$$y = Y - \bar{Y}, x_1 = X_1 - \bar{X}_1, x_2 = X_2 - \bar{X}_2, x_3 = X_3 - \bar{X}_3$$

The normal equations for fitting this equation (ja) are

$$\Sigma yx_1 = b_1 \Sigma x_1^2 + b_2 \Sigma x_1x_2 + b_3 \Sigma x_1x_3 \dots \dots \dots (ii)$$

$$\Sigma yx_2 = b_1 \Sigma x_1x_2 + b_2 \Sigma x_2^2 + b_3 \Sigma x_2x_3 \dots \dots \dots (iii)$$

$$\Sigma yx_3 = b_1 \Sigma x_1x_3 + b_2 \Sigma x_2x_3 + b_3 \Sigma x_3^2 \dots \dots \dots (iv)$$

The required regression equation differentiating wrt x_1 we get irrigation, caltivated land and credit disbursement respectively

A: Coefficient of Determination (R^2)

The R-squared (R^2) statistic is a measure of the sources of regression predicting the value of dependent variable within the sample. The R-squared is the function of variance of dependent variable explained by the independent variables.

$$R^2 = \frac{ESS}{TSS}$$

Where, ESS is the explain sum of square.

TSS is the Total sum of square.

Hence, the value of R square lies between the 0 and 1.

That is $0 \leq R^2 \leq 1$.

The value of R^2 will be one if the regression fits perfectly and Zero if it fits no better than simple mean dependent variable.

B: Adjusted coefficient of determination \bar{R}^2

This statistic is used to get additional information about the goodness of fit. One problem with using \bar{R}^2 as a measure of goodness of fit is that the \bar{R}^2 will decrease as more regression are added. In the extreme case we can obtain \bar{R}^2 of one, if we include as many dependent regressors as there are sample observations. The adjusted, commonly denoted as, \bar{R}^2 penalizes R^2 for the addition of regressors which don't contribute to the explanatory power of the model.

C: T – test

It is used to test the hypothesis about any individual partial regression coefficient. To compute the t-test, the standard error for each output is computed separately. The t-test ratio is the significant is a procedure by which sample results are used to verify the truth or falsity of a null hypothesis. The decision to accept or reject null hypothesis is made on the value of test statistic obtained from the data. The t-statistic, which is computed as the ratio of an estimated coefficient is equal to zero. To find the intercept

of t- statistic, we should examine the probability of observing the t-statistic given that the coefficient is equal to zero. If the value of test statistic falls in the critical region then the null hypothesis is rejected.

3.4 Cobb-Douglas Production Function

The study attempts to access the impact of agricultural credit to on agricultural production in Nepal using time series data during period of 1993/094 to 2007/08. To investigate the impact of agricultural credit on greater production. We estimated cob Douglas production function. Total agricultural output as dependent variable and agricultural credit disbursement (X_3) for agricultural sector as one of the independent variable. Other explanatory variables included in the study to estimate the Cobb Douglas production function besides irrigation facilities area hactor, (X_1) agricultural cultivated land area heactor. Selections of the explanatory variables has been mode on the basis of literature surveyed and some previous studies. There are some other important determinant of agricultural, use of machinery etc. but these various of are not included in the model since they can be purchased with the availability of credit. Agricultural credit has been directly introduced in the model. Agricultural production function shows the technical relationship between agricultural output and various determinant of agricultural output. we have included total agricultural output (Y) as dependent variable and explanatory variables are credit disbursement in agricultural sector (X_3), cultivated land (X_2) and irrigation facilities X_1) are independent variable. To avoid the problem of multicollinearity and to over come the problem of degree of freedom all the variables are transformed to per cultivated thousand hectars. To estimate the Cobb- Douglas production function all the variables are transformed to log-atrithmic from the model used in the study is.

Cobb- Douglas production is model of aggregate production which shows the maximum possible output with any given set inputs assuming these are used efficiently.

$$Y = Ax_1^{a_1}, x_2^{a_2}, x_3^{a_3} \dots \dots \dots (i)$$

$$\ln Y = \ln A + a_1 \ln x_1 + a_2 \ln x_2 + a_3 \ln x_3$$

Where $\ln Y$ = Agricultural output and $A, a_1, a_2,$ and a_3 are constants

$\ln x_1$ = Irrigation facilities area hacters in million

$\ln x_2$ = Cultivated land area of thousand

$\ln x_3$ = Credit disbursement in million.

$\ln A$ = Efficiency parameter which includes management techniques etc

a_1 , a_2 and a_3 are called output elasticity. When the sum of the exponents equals to unity the Cobb-Douglas production function is linearly homogeneous. That is it exhibits constant returns to scale. If the exponents' sum is more than unity the function exhibit increasing return to scale, and if less than unity there are decreasing returns to scale.

Cobb- Douglas production function in its linearly homogeneous form i.e. $a_1+a_2+a_3=1$ satieties the Eulers theorem.

$$i.e.Y = \frac{dy}{dx_1} \times x_1 + \frac{dy}{dx_2} \times x_2 + \frac{dy}{dx_3} \times x_3$$

Economic meaning of this property is that under the condition of constant return to scale, of each of factors is paid according to its marginal productivity. The total output will be just exhausted, so this theorem in economic sense is also called “ product exhaustion theorem” If the case is $a_1+a_2+a_3 >1$ showing increasing returns to scale, the total output will not be sufficient to pay each factor according to its marginal productivity. Similarly if the case is $a_1+a_2+a_3 < 1$ showing decreasing returns to scale, there will be a surplus of output even after paying each factor according its marginal productivity.

3.5 Definition of Variables

In this study, regression equations have been out on different formats, the variables used in this study are as follows.

Credit disbursement (Cd): credit Disbursement mean the actual providing loan in Agricultural sector during the specified year. It has been taken about exclusively from annual report of ADB/N.

Credit Collection (Cc): credit collection means return loan from farmers.

Credit outstanding (Co): credit outstanding means farmer don't return loan or total investing loan. It has taken out exclusively from annual report of ADB/N.

To obtain the percentage growth rate of credit Disbursement, Collection and Total outstanding. Followings methods have been applied.

Growth rate of credit Disbursement is calculated as

$$D = \frac{Dt - Dt - 1}{Dt - 1} \times 100$$

Where Dt = Disbursement of current year (At current year price)

Dt-1 = Disbursement of previous year.

Similarly, the growth rate of credit Collection is calculated as.

$$C = \frac{Ct - Ct - 1}{Ct - 1} \times 100$$

Where Ct = Collection of loan in current price.

Ct-1 = Collection of loan in previous year. But the average growth rate has been calculated as.

$$\frac{\text{Total growth rates}}{\text{Numberofyears}}$$

The analysis is based on the evidences put forward by ordinary least square regression equation. However, a note of Collection in terms of limited data set, application of limited explanatory variable and low degree of freedom has taken into the account while interpreting the result. Therefore, the result which is found through this process is taken as indicative only. The analysis is based on time series data of 15 years covering the period 1993/94 to 2007/08. Obviously this study period certainly has to do with the significance of the parameters. After examining and analyzing the data the necessary policy measures have been developed for recommendation. This is the last objective of the objective.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATAS

ADB/N initiated development financing programmed to improve economic condition of the rural people by increasing productivity in agricultural practice. The credit delivery, collection and outstanding loan of development financing tune to Rs. 1038.00 million, Rs. 11670.00 million and Rs 23950.00 million respectively as of first eight month 2007/08. an attempt to study the trend of lending, collection and outstanding loan of the development financing sector for 15 years from 1993/94 to 2007/08 has been carried out.

4.1 Disbursement, Collection and Total Outstanding Loan

Table No. 4.1: Disbursement, Collection and Total Outstanding Loan

in million

Year	Disbursement	Growth rate %	Collecti on	Growth rate %	total loan outstanding	Growth rate %
1993/94	2887.97	-	1832.83	-	5311.81	-
1994/95	3433.7	18.89	2165	18.12	6580.5	23.88
1995/96	3896.8	13.48	2788.1	28.78	7689.2	16.84
1996/97	4023.4	3.24	2873	3.04	8839.6	14.96
1997/98	4430.1	10.10	3503.8	21.96	9765.9	10.47
1998/99	5562.4	25.55	4233.9	20.83	11054.4	13.19
1999/2000	7084.7	27.36	5274.8	24.58	12904.2	16.73
2000/01	8089.8	14.19	6198.1	17.50	14782.4	14.55
2001/02	8888.8	9.88	6997.5	12.89	16673.8	12.79
2002/03	10115.2	13.79	8173.3	16.80	18615.7	11.64
2003/04	10148.9	0.33	9050.3	10.73	19714.3	5.90
2004/05	11817	16.43	10330.9	14.15	21173	7.39
2005/06	12855.6	8.78	11841.6	14.62	22187	4.78
2006/07	14650.2	13.96	13788.9	16.44	24194.8	9.04
2007/08	18530	26.48	17460	26.62	25710	6.26
Trend	1002.95		1001.69		1496.54	

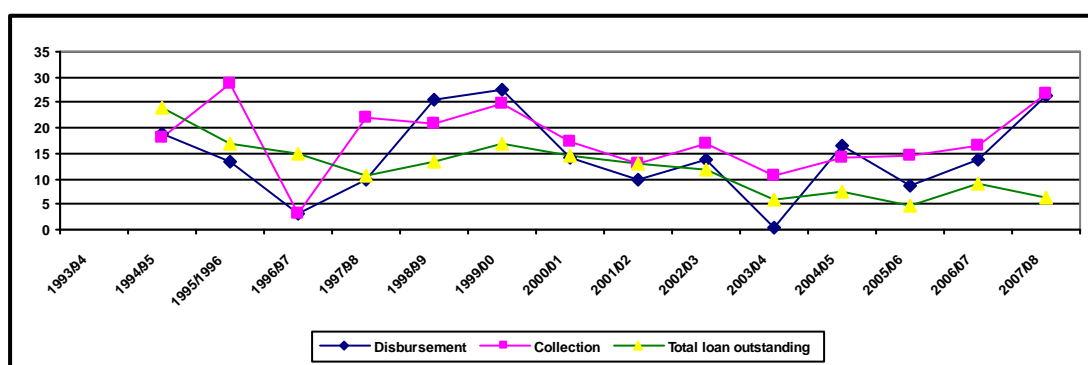
Source: Annual Reports, ADB/N

As it is clear from the table the total loan disbursements, collection and outstanding loan for 15 years of the development financing sector of ADB/N exhibits as linear trend. As per data presented in table lending has increased more thajn threefold in FY

2007/08 as compared to year 1993/94. in FY 1993/94 total loan investment was Rs. 2887.97 million, it increased to Rs. 18530.00 million in FY 2007/08 with annual of Rs. 1002.95 million. Similarly, collection of loan for same period increased from Rs. 1832.83 million, to Rs. 17460.00 million with annual increase of Rs. 1001.69 million. We can see that annual increase in loan collection is less than increase in loan investment. Table shows that loan recovery situation has not improved and revolved around 70- 80 percent. Due to poor recovery of loan, there is continuous rise in outstanding loan. Outstanding loan has increased to Rs. 25710 in FY 2007/08 from Rs. 5311.81 in FY 1993/94 with annual growth of Rs. 1496.54 million. In previous data shows in the graph:

Figure No.: 4.1

Annual Growth Rate of Total Agricultural Credit Trends



Source: Annual Reports, ADB/N

In graph indicates that the disbursement of loan by the bank has irratic trend during the period under review. In the FY 1994/95 it has recorded 18.89 percent increase over the previous year. However in the f year 1996/97 it has decreased by 3.24 percent. Again in the year 1999/2000 it has further indorsed 27.36 percent. But from the year 2003 / 04 it has decreased of 0.33 percent. So the disbursement of loan is some time increased and some time decreased. The reason for erratic trend of loan disbursement on the part of ADB/N are mainly due to the lack of fertilizers irregularity and foreign aid, due to the reason of political change, political instability and marketing problem etc.

In FY 2003/ 04 Disbursement of loan growth rate is decreased 0.33 Percent at that situation political destervences in country. So, the Bank doesn't open the branch of in the village area. The main cause of this situation is moist conflict. So, the loan

disbursement of the ADBN is decreased. And the other reason is that the ADBN has good sources of finance irrespective of low collection of farmers.

4.2 Disbursement of Loan

The ADB/N has categorized its loan portfolio in to seven purposes Analyzing the data presented in table almost all purposes exhibit increasing trend except purposes like Agri. Tools and Irrigation, Tea/coffee cultivation and Horticulture. These purpose on an average exhibit declining trend. The most potential purpose from lending point of view is marketing loan. It has increased from Rs. 840.21 million to Rs. 8270 million in 15 years with average, annual growth rate of 523.21 million.

Table No. 4.2: Loan Disbursement by Purpose

In million

Year	Food Grains and cash crops production	Agri. Tools and irrigation	Agri. Business	Agre indusing marketing and Godown	Hericulture	Tea/coffe cultivation	Houseing and land development loan	Total
1993/94	811.46 (28.09)	557.04 (19.28)	585.19 (20.26)	840.21 (29.09)	35.28 (1.22)	37.34 (1.29)	21.44 (0.74)	2887.97
1994/95	894.8 (26.05)	678.4 (19.75)	694.5 (20.22)	972.3 (28.31)	36.4 (1.06)	50.7 (1.47)	106.6 (3.10)	3433.70
1995/96	1015.6 (26.06)	661.5 (16.97)	768.5 (19.72)	1224 (31.41)	37.1 (0.95)	43.5 (1.11)	146.6 (3.76)	3896.80
1996/97	993.6 (24.69)	609.1 (15.14)	795.4 (19.77)	1387.8 (34.49)	35.5 (0.88)	43.7 (1.08)	160.3 (3.98)	4023.40
1997/98	1170 (26.41)	580.4 (13.10)	866.6 (19.56)	1559.1 (35.19)	36 (0.81)	41.8 (0.94)	176.2 (3.97)	4430.10
1998/99	1465.9 (26.35)	823 (14.79)	1029.3 (18.50)	1969.9 (35.41)	30.1 (0.54)	83.6 (1.50)	160.6 (2.87)	5562.40
1999/2000	1756.3 (24.79)	1027.7 (14.50)	1221.7 (17.24)	2772.5 (39.13)	61.5 (0.86)	138 (1.94)	107 (1.51)	7084.70
2000/01	1913.2 (23.64)	1084 (13.39)	1349.8 (16.68)	3448.8 (42.63)	36.8 (0.45)	141.9 (1.75)	115.3 (1.42)	8089.80
2001/02	1891.9 (21.28)	958.7 (10.78)	1570.1 (17.66)	4150.1 (46.69)	38.2 (0.43)	97.5 (1.09)	182.4 (2.05)	8888.80
2002/03	2121.5 (20.97)	806.6 (7.97)	1634 (16.15)	4868.1 (48.12)	48.2 (0.47)	52.1 (0.51)	584.7 (5.78)	10115.20
2003/04	1820.1 (16.32)	591.7 (5.30)	1599.5 (14.34)	4955.8 (44.45)	31.5 (0.28)	40.9 (0.36)	1109.4 (9.95)	10148.9
2004/05	1956.1 (16.55)	542.6 (4.59)	1842.8 (15.59)	5605.3 (47.43)	38.7 (0.32)	36.5 (0.30)	1795 (15.18)	11817.00
2005/06	1799.5 (13.99)	395.8 (3.07)	1872.7 (14.56)	6590.4 (51.26)	31.9 (0.25)	23.6 (0.18)	2141.7 (16.65)	12855.60

2006/07	3630.3(24.78)	289.8 (1.97)	1658.9 (11.32)	6543.4 (44.66)	56.4 (0.38)	38.9 (0.26)	2432.5 (16.60)	14650.20
2007/08	4590 (24.77)	370 (1.97)	2100 (11.33)	8270 (44.63)	80 (0.43)	50 (0.26)	3070 (16.56)	18530.00
Trend	138.25	-19.45	106.63	523.21	1.49	-0.774	198.45	1002.95

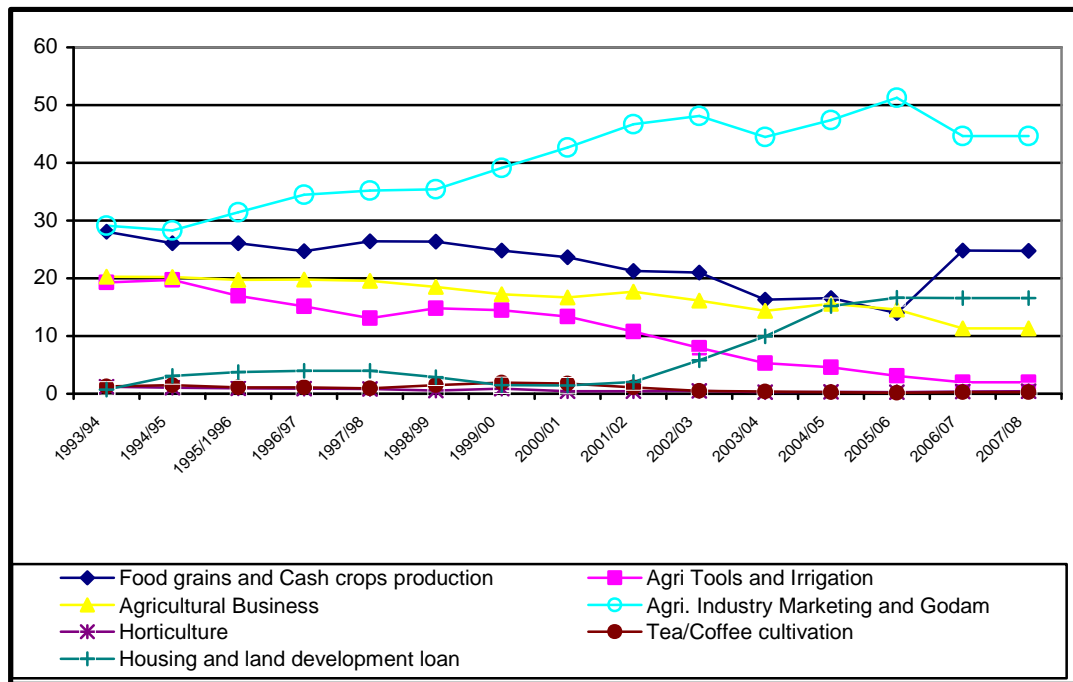
Source: Annual report of ADB/N

In 1998/99 for six consecutive year's highest disbursement in recorded for Agri-Industring marketing and Godown purpose. The major four purposes, Foods Grains and cash crops production, Agri. Industring marketing and Godown, Housing and Land development loan and Agri. Business cover more than 80 percent of total credit delivery.

In the mean time credit provided for commercial purpose has emerged as new sector in credit market. Now a days the ADB/N is fully commercial so lending for non-agro credit has increased. Analyzing main reason behind the increase in Agri. Industring marketing and Godown potential and demand for the above purpose is due to urbanization. For last for four year credit delivery for Agri- Tools and Irrigation is not uniform. It can be seen from the above data that investment in Agri industries marketing and Godown loan is increased. In annual trend the disbursement loan for Agri. Tools and irrigation is negative impact and Agri. Industring and marketing is positive impact. In FY 1993/94, loan disbursement for food Grains and cash crops production and Agri. Tools and irrigation is were Rs.811.46 million and Rs.557.04 million respectively. After 15 years FY 2007/08 credit delivery for food Grains and cash crops production increased to Rs.4590.00 million where as for Agri Tools and irrigation lending decreased to Rs.370.00 million. As we find that there is sharp declination in investment in Agri. Tools and irrigation. Investment in irrigation declined due to cut off of aid from Government for shallow tube wells. Now farmer have to finance themselves for irrigation therefore Investment in irrigation is declining. It has negative impact on foods Grains and cash crops production.

Analyzing the above data we found that only four, purposes, Food Grains and cash crops production, Agri Industring marketing and Godown, Housing and Land development loan and Agri Business has seen continuous increment in lending other wise, all other purposes are sometimes increasing and some time decreasing.

Figure No. 4.2: Trends in Sectoral Agricultural Credit Disbursement



Source: Annual report of ADB/N

From the above graph we have seen that the annual loan disbursement is different for different purpose. Agri. including marketing and Godown has got high priority in loan investment in the year 1993/94 it has recorded 29.09 percent which is however in the year 1994/95 it has decreased from 28.31 percent However, in the year 1995/96 it has increased from 28.31 percent to 31.41 percent. Again other year the loan disbursement trend increased, in the year 2005/06 It has highly increased 51.26 percent. Than He next year the loan disbursement decreased from previous years. So, the ADB/N first priority of loan disbursement in Agri including marketing and Godown.

Second Priority has given for Housing and land development loan. Its annual Trend is increased Rs.198.45 million. Third priority for this sector of ADBN has given for food grains and cash crops production. It annual Trend is Rs.138.35 million. The percent of loan disbursement of food grains and cash crops production is increased. Fourth priority agricultural business and fifth priority horticulture, six priority tea/ coffee cultivation and last priority is Agri. Tools and irrigation agricultural business and Horticulture Trend is positive. But Tea / Coffee cultivation and Agri. foods and irrigation trend is negatively.

Table No. 4.3: Loan Disbursement by Term

In million

Year	short-term	medium -term	Long-term	Total
1990/91	452.3	603.9	38.9	1095.1
1991/92	583.3	840.5	45.1	1468.9
1992/93	717.9	1195.2	72.1	1985.2
1993/94	1046.21	1739.26	102.5	2887.97
1994/95	1293.52	2041.68	98.55	3433.7
1995/96	1537.92	2248.48	110.44	3896.8
1996/97	1560.68	2343.87	118.87	4023.42
1997/98	1889.9	2451.85	88.32	4430.1
1998/99	2463.15	2959.74	139.51	5562.4
1999/20	3239.62	3687.02	211.07	7084.7
2000/01	3800.5	4010.01	279.34	8089.8
2001/02	4355.96	4326.63	206.27	8888.8
2002/03	5457.46	4508.37	149.44	10115.27
2003/04	6053.78	3959.07	135.71	10148.9
2004/05	7777.39	3957.04	82.61	11817
Trend	474.50	113.20	8.62	763.10

Source: Annual reports of ADB/N

Date for term-wise credit delivery reflects that short term (loan for Foods Grains and cash crops production, fishing, bee- keeping, nursery) and medium term (loan for Agro- tools and irrigation, poultry, livestock, horticulture, Agro industry, tourism, non-agro, energy development, land development loan) portfolios are the major factor in the lending activities which altogether cover more than 95 percent of total loan investment.

As per the expansion of credit delivery is concerned short and medium term portfolios have displayed impressive record of annual increment trend with Rs. 474.50 million and Rs.113.20 million respectively. Though the long term (Tea/coffe cultivation and Agro industring marketing and Godown) portfolio manages to increase its performance is still overshadowed by small credit compared to short and medium term portfolio. Compared to FY 1990/91 it has decreased in FY 1991/92. in FY 1992/93 and 1993/94 it has increased. Again in FY 1996/97 it has decreased. Similarly, in FY 2004/05 it has increased compared to previous year. Short term

credit deliver is increased than medium-term credit delivery. So the short-term credit deliver is positive impact in Agricultural production. Thus, long term credit delivery is not uniform and its growth is not satisfactory. Long term loan investment for future planning such as irrigation, land development, increase in facilities and farm machinery. As investment for irrigation, land development and Tea/coffe cultivation is declining, performance of long term credit is not satisfactory. The long-term credit delivery is negative impact in Agricultural production.

4.3 Collection of Loan by Purpose

Table No. 4.4: Collection of Loan by Purpose

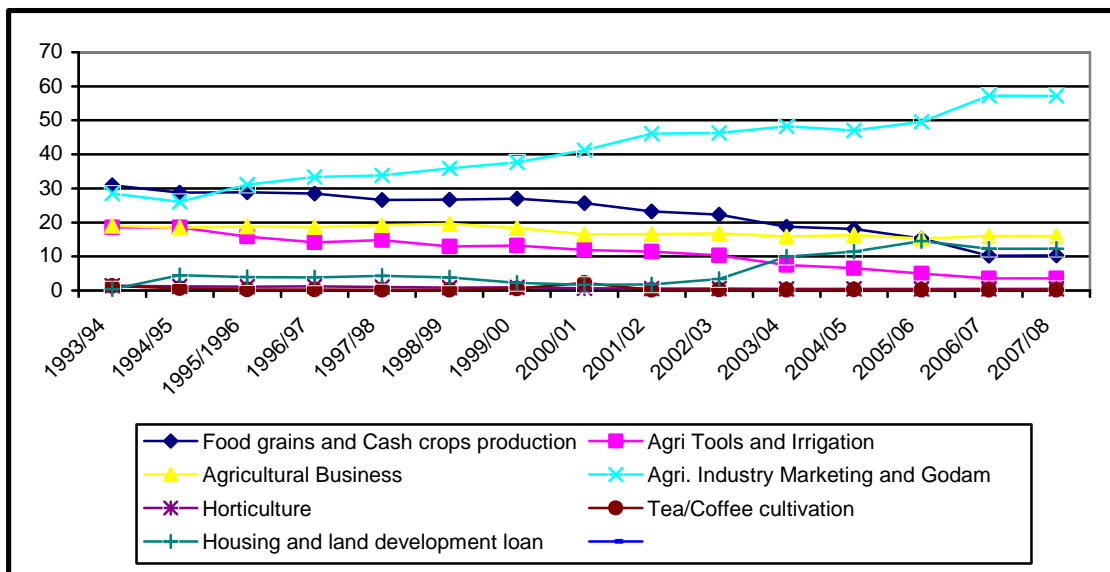
In million

years	Food Grains and cash crops production	Agri.Tools and irrigation	Agricultural business	Agri. Industiring marketing and Godown	Hericulture	Tea/coffe cultivation	Housing and Land development Loan	Total
1993/94	566 (30.88)	339.4 (18.51)	348.23 (18.99)	521.59 (28.46)	26.08 (1.42)	24.92 (1.35)	6.63 (0.36)	1832.83
1994/95	662 (28.73)	400.8 (18.51)	400.4 (18.49)	564.5 (26.07)	26 (1.20)	14.2 (0.65)	97.1 (4.48)	2165.00
1995/96	804.5 (28.85)	440.7 (15.80)	525.7 (18.85)	868.4 (31.15)	31.20 (1.12)	8.00 (0.28)	109.6 (3.93)	2788.10
1996/97	818.3 (28.48)	407.9 (14.19)	536.3 (18.66)	957.5 (33.33)	35.7 (1.24)	8.00 (0.27)	109.3 (3.80)	2873.00
1997/98	934 (26.65)	518.3 (14.79)	671.7 (19.17)	1186.3 (33.85)	35.1 (1.00)	6.3 (0.18)	152.1 (4.34)	3503.80
1998/99	1132.1 (26.73)	547.7 (12.93)	829.2 (19.85)	1517.7 (35.85)	33.9 (0.80)	9.1 (0.21)	164.2 (3.88)	4233.90
1999/2000	1423.7 (26.99)	699.3 (13.25)	968 (18.35)	1986.8 (37.66)	48 (0.90)	30.3 (0.57)	118.7 (2.25)	5274.80
2000/01	1594.7 (25.72)	736 (11.87)	1024.8 (16.53)	2556.3 (41.24)	39.1 (0.63)	142.2 (2.29)	105 (1.69)	6198.10
2001/02	1627 (23.25)	802 (11.46)	1159.1 (16.56)	3229.8 (46.15)	40 (0.57)	15.9 (0.22)	123.7 (1.76)	6997.50
2002/03	1819.7 (22.26)	846.7 (10.35)	1367.9 (16.73)	3787.2 (46.33)	49.5 (0.60)	25.9 (0.31)	276.4 (3.38)	8173.30
2003/04	1696.5 (18.74)	682.1 (7.54)	1429.1 (15.79)	4366 (48.24)	39 (0.43)	14.6 (0.16)	823 (9.09)	9050.30
2004/05	1865.7 (18.05)	674.4 (6.52)	1679.8 (16.26)	4857.5 (47.01)	50 (0.48)	25.9 (0.25)	1177.6(11.39)	10330.90
2005/06	1810.5 (15.29)	585.1 (4.94)	1779.8 (15.03)	5866.4 (49.54)	51.9 (0.44)	27.8 (0.23)	1720.1(14.52)	11841.60
2006/07	1415.6 (10.26)	485.6 (3.52)	2212.5 (16.04)	7892.3 (57.24)	61.9 (0.45)	21.5 (0.15)	1699.5(12.32)	13788.90
2007/08	1800 (10.30)	620 (3.55)	2800 (16.03)	9980 (57.15)	80 (0.46)	30 (0.17)	2150 (12.31)	17460.00
Trend	93.73	19.47	151.50	593.16	2.81	1.05	139.94	1001.69

Source: Annual Report ADB/N

Purpose-wise the highest collection of loan is registered in Agri. Industries marketing and Godowns with the all annual growth of Rs.593.16 million. It has increased from 521.59 million to Rs.9980 million. As loan investment marketing is highest, collection from this purpose is highest, marketing is followed by Agro-industry and livestock. In the same time lowest repayment of the loan is registered in Tea/coffee cultivation with sharp declination of Rs.1.05 million but not negative. In FY 1993/94 it was Rs.24.08 million which is increased to Rs.30.00 million in FY 2007/08. FY 1999/2000 it was very highest increased to Rs.142. Million. Irrigation collection loan are sometime increasing and some time decreasing almost all purposes except Tea/coffee cultivation, Horticulture and Agri- Tools and irrigation display positive but low annual growth rate of collection. Table show that although food Grains and cash crops production, agricultural Business, Agri Industries marketing and Godowns and Housing and land development loan are highest exhibits positive growth rate on average, other is low growth rate on average.

Figure No. 4.3: Trends in sectoral Agricultural Credit Collection



Source: Annual Report ADB/N

4.4 Loan Collection by Term

Table No.4.5: Loan Collection by Term

In million

Year	Short-term	Med.-term	Long term	Total
1990/91	344.5	393	13.8	751.3
1991/92	508.8	604.4	19.2	1142.3
1992/93	522.1	808.1	53.6	1383.8
1993/94	706.77	1063.96	62.09	1832.83
1994/95	885.88	1230.52	48.58	2165
1995/96	1162.34	1572.8	52.97	2788.1
1996/97	1228.67	1577.83	66.56	2873
1997/98	1449.08	1988.16	66.57	3503.8
1998/99	1860.79	2304.77	68.4	4233.9
1999/20	2477.45	2798.74	65.17	5274.8
2000/01	2944.61	3055.15	198.39	6198.1
2001/02	3456.19	3459.59	81.73	6997.5
2002/03	4172.67	3887.45	113.22	8173.3
2003/04	5126.36	3851.53	135.71	9050.3
2004/05	6281.48	3941.72	107.66	10330.9
Trend	385.54	364.22	7.67	669.80

Source: Annual reports of ADB/N

On the way of assessing the term-wise collection short and medium term turnout to be the dominant portfolios as in loan disbursement short and medium term loan disbursement cover more than 95 percent of total loan investment. As a consequence, these two portfolios together covered almost 98 percent of the entire collection. Term-wise highest repayment of the loan is recorded in short-term loan with annual growth of Rs.385.54 million.- In the mean-time medium and long term portfolios have recorded the annual growth rate of Rs.364.22 million or- and Rs.7.67 million long-term loan collection respectively. In FY 1990/91 short term loan recovery remained 58.05 percent and long term loan has recovery remained 2.39 percent of total recovery. In term of composition of total recovery short term loan flow from medium term loan has decreased to 47.56 percent. This indicates the shift of loan flow from medium term to short term. The long term loan has shown show but increasing trend since FY 1990/91 for four years but after FY 1994/95 it is decreased than after it is

increased or inconsistent. Disbursement and collection of long term portfolio is overshadowed by short and medium term portfolio respectively. As return from long term credit is less or nominal compared to short term and medium term, ADB/N has emphasized on short term medium term than long term portfolio.

4.5 Agricultural Credits Disbursement and Collection for First Eight Month of 2008/09

Table No. 4.6: Agricultural Credits Disbursement and Collection for First Eight Month of 2008/09

	In million	
	Disbursement	Collection
Food Grains and cash crops production	1700.00	2920.00
Agri. Tools and Irrigation	300.00	440.00
Agricultural Business	178.00	1510.00
Agri. Industries marketing and Godown	5280.00	4500.00
Horticulture	20.00	50.00
Tea/coffee cultivation	20.00	20.00
Housing and Land development loan	1280.00	2230.00
Total	10380.00	11670.00

Source: Annual reports of ADB/N

In first eight month the loan collection higher than loan disbursement. Loan disbursement in the year the first priority in Agri industries marketing and Godown. For Rs.5280.00 million and second priority food grains and cash crops production Rs.1700 million other sector are housing and land development loan for Rs.1280.00 Million, Agri. Tools and irrigation for 300.00 million agriculture business for Rs.17.00 million and Tea / coffee cultivation and Horticultural are some for 20.00 million. In the first eight month the loan collection is increased. At that time highly loan collection is Agri Industries marketing and Godown for Rs.45.00million and low loan collection in tea / coffee cultivation for Rs.20.00 million. In first eight month the loan disbursement and collection of Tea/coffee cultivation is same for Rs.20.00 million respectively.

4.6 Agricultural Production Status

So, for as agricultural production in Nepal was began from ancient period by traditional processes with traditional tools and equipments. The quantity of food crops

production at present. Increase although it is one of main cash crops. But, foods crops production trend is decreased in time period duration. to reduce the existing poverty of the people agricultural sector requires a drastic change from subsistence status to industrial process and profitable venture so that productive employment and income can be generated for the benefit of poor mass. In the process domestic market for industrial sectors and other non-agricultural products will expand. To be self sufficient in supplying raw materials needed for agro-based industry and development of agriculture to its full potential foods crops production will play a significant role. Adequate supply of chemical fertilizer, high yielding variety of seeds, improved animal breed and access of agriculture credit are vital inputs for the desired changes in agriculture system. Irrigation is another critical inputs with a view to reduce dependency of agriculture on erratic monsoon rains.

Production of major food crops (Rice, Wheat, Maize, Millet, and Burley) increased by 740,000 MT (10 percent) in FY 2007/08 to 8,6069,000 MT as compared to the previous year. The preliminary estimations show that the production of these crops will rise further by 46,000 MT (0.6 percent) reaching 8,115,000.00 MT in the current fiscal year as compared to the preceding fiscal year. The area covered by such crop in FY 2007/ 08 was 3,416,000 hectares, which was 3.4 percent increase in cultivated area.

Table No. 4.7: Productivity of Agricultural Crops

Product	kg/ Ha fiscal year 2007/08
Food crops	2361
Rice	2775
Maize	2159
Wheat	2225
Millet	1096
Barley	1076
Pulses(Logume crops)	842
Horticulture	-
Potato	13110
Vegetable	12200
Fruits	9941

Source: Agricultural Business promotion, and statistical Division, Ministry of Agricultural and cooperatives.

Since there is 4 wide diversity in the to pography and agro climatic conditions in various regions of Nepal, the land resources. position and its utilization practices also differ between the region. Table present the total area of land operated by all agricultural holdings in 2001/02 18.00 million hectares. All land operated by agricultural holding is classified as either agricultural land or non agricultural land of the total area in 14718 million hectare as under agricultural land cultivated 21.00 percent and agricultural land uncultivated 7.00 percent forest 20.00 percent, scrubland, 10.6 percent, Grass land and pasture 12.00 percent water 2.60 percent other 17.80 percent covered the land in Nepal. Therefore according to the statistics given in the some possibility of expanding arable land by reclamation in the hill is visible. As the total mountain region is grass land and used for yak an sheep grazing. This area is not feasible for crop cultivation. It is the fact that more than 35.0 percent of the total area comes under perpetual show cover, glacier and rugged ridges in mountain region is not fit for

Table No. 4.8: Land Use (000 Hectors)

Agricultural land cultivated	3091	21.00%
Agricultural land uncultivated	1030	7.00%
Forest	4268	29.00%
Scrubland	1560	10.60%
Grass land pasture	1766	12.00%
Water	383	2.60%
Other	2620	17.80%
Total	14718	100%

Source: Nepal Biodiversity Action plan 2000MFSc

4.7 Cropping Pattern

Cropping pattern has a significant bearing on estimating the loan requirements. Being a part of the Gangetic plain, the Terai region is highly fertile. Therefore, the pattern of rotation of crops indifferent region differ according to the texture of soil climatic conditions, uncertainty of monsoon, different temperatures and division of the year in to wet and dry seasons, and the ethno-social behavior of the farming people. As

mentioned earlier, agriculture is a way of life in Nepal and the economic motive of maximum gain has not entered in to their calculations.

Rice is the most important cropping Nepal. This is particularly true in the Terai. In the irrigated low lands, Hill an mountain regions the best cropping pattern is a wet season paddy followed by a dry season winter crop of wheat. This pattern gives the highest yields of both crops. In some of the eastern Terai, districts, jute is cultivated as a wet season crop and is followed by either paddy or dry season wheat or mustard or winter maize. In the low lands, where irrigation facilities are not available, paddy is cultivated as a wet season crop and is followed by mustard, lintel, munghean, linseed or wheat alternatively, two crops of paddy follow the leaving of that land as follow is a pattern adopted by some low land farmers. This practice is also followed in some Hill region but it is not feasible in the mountain region (Chitrakar, 1990).

In the region, where most of the land is un-irrigated, maize is the most important crop. Maize is grown during the wet season followed by relayed planting of finger millet. In mountain region also the cropping patterns are maize based, but the maize crop is followed by back wheat, or necked barley or barley. In some case the maize crop is followed by potato.

The basic objectives of farmers in order to adopt diversified cropping patterns are to maintain soil gentility and to get the maximum advantage out of the resources available at their disposal under a particular geo-climatic environment. Therefore, mixed cropping relay planting and growing of perennials are common practices in all the ecological in Nepal it is cultivated as monoculture in the mountain and hill regions in Nepal it is cultivated as a mountain and Hill region in Nepal. It is cultivated as a mixed crop with either soybean, other beans or higher. Before harvesting the maize crop, finger millet is relayed to save the moisture available and temperature to improve the sequential crop grown. In other situations, maize is grown as a wet season crop along with soybean and is followed by mustard. Where irrigation is possible, wet season maize is followed by a potato crop in the winter, under low land conditions such as in the Kathmandu valley where the demand for vegetables is high, Farmors and growing early paddy and following this vegetables and still successfully growing a potato crops.

However, all the cultivated land in Nepal should be covered with a crop in the wet season when moisture is not limiting factor. But in the dry season, crops depend upon the available moisture and the socio-economic conditions and decision – making processes of the farming people. Therefore the cropping intensity in Nepal is not high despite the diversified cropping system. In general, the cropping – intensity is high where irrigation facilities are not the only factor in increasing the cropping interest in Nepal.

According to the central bureau of statistic, the cropping intensity increased from 1.75 percent to 1.77 percent during 1991-92 to 2001/02. The cropping intensity estimated at present is about 1.77 percent on average. In some place; of course, where short duration paddy is grown and irrigation facilities are available, the cropping intensity is estimated 300 percent under optima conditions further more. If the wet and dry seasons are considered under irrigated conditions, a maximum yield can be obtained, all, also being equal. If three crops are attempted under irrigated condition, the total productivity from the crop grown could be higher but maximum yield per crop grown is difficult due to climatic and other variable.

4.8 Irrigation Facilities

Irrigation plays a key role in the development of agriculture sector which has remained the backbone of the Nepalese economy although agriculture sector contributed to a big chunk of Gross national production, the contribution of irrigation has been comparatively lower than that was expected. However, the agricultural sector has still to rely largely on rainfall. Frequent draught and excessive rains have, on the other hand, hampered the actual growth of agriculture production. It has hard fact which one should un hesitatingly accept that a rapid population growth in Nepal has led to a situation of food import for meeting the growing demand. In this context, it has become essential to emphasize that irrigation programme for increased agriculture production with the use of surface and groundwater resources available in the country.

While planning for irrigation development it is also necessary to maintain coordination between irrigation and agricultural production programs towards achieving maximum gains. It has also become important to entrust full, responsibility

of the operation and management of irrigation systems to user farmers after soliciting their organized participation in the identification feasibility studies, selection and implementing of irrigation system.

However, it should be noted that there is an extreme seasonal variation in rainfall influenced by the monsoon. Nearly so percent of total annual rainfall occurs the four months from June to September. The strong season ability pattern of rainfall with its consequent effects on the river flows make full introduction of round the year surface irrigation a relatively expensive exercise in the Terai. In the Hills there exists little economic as physical possibilities of storing large amounts of seasonally available water due to topographic constraints. However Nepal is very rich in water resources, but many of its rivers have not been utilized fully. In this respects table point out the development of irrigation facilities during the time period.

Table No.4.9 : Irrigation Facilities During the Time Period

Year	Irrigation facilities	Change %
1993/94	33542	-
1994/95	25372	-24.4
1995/96	48530	91.3
1996/97	32018	34.0
1997/98	21447	33.0
1998/99	49015	128.5
1999/2000	35702	-27.2
2000/01	29661	-16.9
2001/02	17587	40.7
2002/03	11823	-32.8
2003/04	12753	7.9
2004/05	11325.5	-11.2
2005/06	18402.0	62.5
2006/07	26967.5	46.5
2007/08	16613.0	-38.4
Average		-14.9

Source: Department of Irrigation and agricultural development Bank

Above table show the irrigation facilities area hater in different time period. In FY year 1994/95 irrigation facilities is decrease 24 percent than the previous year. In FY 1998/97 irrigation facilities is increase 91.3 percent. In recover situation irrigation facilities is very increase at that situation the government provide the loan to irrigation sector. After in FY 1998/99 the irrigation facilities is highly increase in 128.5 percent because at that time the irrigation planning is fulfilled and the rainy season the rainfall is sufficient. So the river water speed is highly growth i.e. the irrigation facility is highly increase than the other time period. The government spent more money in irrigation fields. In ninth plan period the government celebrated the long term prospective planning in agricultural sector. The government good policies take in agricultural development so that time period irrigation facilities are highly increased 128.5 percent but not sufficient. After in our country irrigation facilities are decreased for four year. In FY 2001/02 the irrigation facilities is highly decreased 40.7 percent. The irrigation facilities of average growth rate are 14.1 percent. In country cultivated land irrigation facilities is very low, rate of cultivated land is dry in Hill and Mountain area. It impact in geographical situation.

Agricultural production pattern in Nepal is very much conditioned by geographical and climatic factors. The major portion of the cropped area is concentrated in the Terai region. Being a subsistence agricultural system, an overwhelming proportion of cropped area is devoted to food production.

The annual crops like food crops, commercial crops and fruit/vegetable contribute a major share of the total agricultural production. Agricultural production in Nepal depend greatly upon nature, timely commencement of monsoon enhances the country's agricultural productivity, because of the limitation of irrigated land area. The failure of rainfall results is share decline in production. Nepal has 2.32 million hectares of cultivated land, which is spread evenly among the different ecological regions which are greatly influenced by diverse geo-climatic conditions.

4.9 Impact of Agricultural Production

Table No.4.10: Impact of Agricultural Production

Year	Agriculture production (in million)	Area of hector irrigation	Area of land in production (in thousand hector)	Credit disbursement in million
	Y	X ₁	X ₂	X ₃
1993/94	80589	33542	3426	2887.97
1994/95	85569	25372	3432	3433.7
1995/96	96896	48530	3595	3896.8
1996/97	108785	32018	3619	4023.4
1997/98	112495	21447	3609	4430.1
1998/99	122373	49015	3631	5562.4
1999/2000	145131	35702	3711	7084.7
2000/01	211370	29661	3706.5	8089.8
2001/02	223256	17587	3693.4	8888.8
2002/03	232939	11823	3739	10115.2
2003/04	248936	12753	3748.2	10148
2004/05	265458	11325.5	3761.2	11817
2005/06	281670	18402	3775.7	12855.6
2006/07	303175	26967	3721.5	14650.2
2007/08	343385	16613	3830.3	18530

Source: CBS, Ministry of Agriculture and co-operatives, department irrigation and annual report of ADB/N

From the above table study of last few years the production was decreasing. Also it is forecasted that total agricultural output fiscal year 2000/01 is highly increased. It incensed Rs.45131 to 211370 million respectively. The trend line stows the actual production is highly increased. Than after other year the agricultural output increased in decrease growth rate. In conclusion the agricultural output is sole cash crop and food crops which it takes seven eight months for the production process is increased. Due to early start of monsoon rains, and sufficient rainfall between mid July and mid September there has be increased the land and productivity which the increment in overall agricultural production agricultural credit, cultivated land, irrigation are impact in agricultural production. Other extra variable, labor, weather, climate, chemical fertilizer improved, seeds and natural disastors impact in agricultural production. Whether is negative impact of agricultural production despite the negative impact in some areas brought about by the monsoon floods with onset of monsoon beginning from the third week of July to end August 2008 in some parts of Terai,

enough precipitation enabled paddy plantation in non-irrigated (upland area) helping increase the area under paddy cultivation and productivity there by increasing overall paddy production. maize production, however got adversely impacted due to water logging reports from the Department of Hydrology and methodology states that months ending in mid-June received 131 percent mid-July 88percent, mid August 101 percent and mid September 94 percent of rainfall. Enough rainfall during the paddy-growing season had a positive impact on production of these crops.

Climate in the current fiscal year appeared favorable for winter crops like, wheat, barley, pulses and fruit, rainfall reports of different places state that January, February and March received less than an average rainfall. Of the 35 stations, 11 did not receive rain at all, 4 stations with minimum rain while Okhaldhunga received less than 50 percent of rain and the rest received nominal amount of rain.

Impact of natural disaster in agricultural production. The recent Saptakoshi flood and excessive rainfall in the Kailali and Kanchanpur of western Terai and nominal rainfall in the other parts of the country have affected the annual food crops this years similarly, about 31,000ha of land were destroyed by inundation, river cutting and sand like wise, due to lack of precipitation, some parts of Mahottori, Kaverepalanchowk could not have paddy plantation

Table No. 4.11: Log liner from of Agricultural Production Trend

Year	Log Y	LogX ₁	LogX ₂	LogX ₃
1993/94	4.906276	4.525589	3.534787	3.460593
1994/95	4.932316	4.404355	3.535547	3.535762
1995/96	4.986306	4.68601	3.555699	3.590708
1996/97	5.036569	4.505394	3.558589	3.604593
1997/98	5.051133	4.331367	3.557387	3.646414
1998/99	5.087686	4.690329	3.560026	3.745262
1999/2000	5.16176	4.552693	3.569491	3.850321
2000/01	5.325043	4.472186	3.568964	3.907938
2001/02	5.348803	4.245192	3.567426	3.948843
2002/03	5.367242	4.072728	3.572755	4.004974
2003/04	5.396088	4.105612	3.573823	4.00638

2004/05	5.423996	4.054057	3.575326	4.072507
2005/06	5.449741	4.264865	3.576997	4.109092
2006/07	5.481693	4.430833	3.570718	4.165844
2007/08	5.535781	4.220448	3.583233	4.267875

Source: CBS, Ministry of Agriculture and co-operatives, department irrigation and annual report of ADB/N

Undoubtedly the cropland is decreasing every year. Though the agricultural production is declining not only by decreased land but other factors are also responsible as well. When agricultural production is concerned, the main reason responsible for the decreasing growth rate of irrigation facilities, in general, is the risk and uncertainty in the Nepalese context, that bring more speculative nature in business activities. Moreover, the outcome of destruction caused by natural factors such as excessive rainfall and drought are other factors to increase the chances of risk and uncertainty. The uncertainty is largely involved with the man-made causes like socio-economic, eco-politics other various devices, i.e. institutional, technical implication etc. Hence average yields rate runs along with its own character.

4.10 Method of Analysis

4.10.1 Regression Method

Regression analysis is one of the various econometric methods to derive estimates of the parameters of the economic relationship from statistical observations. The aim of the regression analysis is also to determine the factor which causes the variation of the dependent variable. Comparatively, regression analysis is a more powerful method to study economic relationships from the data which are not experimental. Thus, in the regression equation analysis, the variable constituting the cause is taken as the independent variable. As there are four variables under study, multiple regression analysis is needed to be used. In this study, the total agricultural output is taken as the dependent variable while three other variables, i.e. area Ha, irrigation facilities, area of cultivated land and credit disbursement ADB/N are taken as the independent variables. Credit disbursement of ADB/N is the main variable of this data. Hence the variables, the number of irrigation, cultivated land and credit disbursement as represented by X_1 , X_2 , X_3 respectively are the explanatory variables and their effect is reflected on the output

represented by Y. The cause and effect relationship of the above mentioned four variables is given by the following regression equation (multiple) of Y on X₁, X₂ and X₃

$$Y = A + b_1 \log x_1 + b_2 \log x_2 + b_3 x_3 \dots \dots \dots (i)$$

a= constant parameter.

$$Y = 0.43987 - 0.10263x_1 + 0.636425x_2 + 0.770014x_3 \dots \dots \dots (i)$$

To find the irrigation facilities (x₁) differentiating equation (i) with respect to irrigation facilities (x₁)

$$\frac{dy}{dx} = -0.10263$$

ie ME_a = 0.10263 [ME_a= marginal irrigation facilities of hectors of land]

When irrigation facilities (x₁) changes by one unit, change in total output (Y) will be – 0.10263 but the relationship is inverses remaining cultivated land (x₂) and total credit disbursement (x₃) constant. i.e. output decrease by 0.10263 unit when the irrigation facilities decrease by one extra unit.

To find the marginal cultivated land (x₂) differentiating equation (i) with respect to cultivated land (x₂) then

$$\frac{dy}{dx_2} = 0.636425$$

i.e. M_{x2} = 0.636425 (M_{x2}- marginal productivity of land)

When cultivate land of crops (X₂) changes by one unit, change in agricultural output (Y) will be 0.636425 unit and relationship is positive remaining irrigation facilities (X₁) and total credit disbursement (x₃) constant i.e. output increases by 0.636425 unit when cultivate land increase my one extra unit.

To find the total credit disbursement in agricultural sector (X₃) differentiating equation (i) with respect to total credit Disbursement (X₃) than

$$\frac{dy}{dx_3} = 0.77014$$

i.e. $M_{X_3} = 0.77014$ [M_{X_3} Marginal credit disbursement]

When credit disbursement in agricultural sector (X_3) Changes by one unit change in output (Y) will be 0.770014 unit and relationship is positive, reaming the other variable. Irrigation facilities (X_1) and total cultivated land (X_2) constant, i.e. output increases by 0.770014 unit when credit disbursement increase by one extra unit.

Finally the equation depicts that when inputs (x_1 , x_2 and x_3) are changed in the same proportions, the output (Y) changes more than proportion, which implies the production process is operating in the first stage i.e. in the increasing returns to scale. This means output increase more than proportions when in all inputs are increased in equal proportion and vice- versa.

The conclusion that can be derived from the above result is that three inputs are not properly adjusted in production process. Irrigation facilities less than in comparison to cultivate land area. This further means the cultivated dry land area more than irrigation facilities land area. So the irrigation facilities is negative impact in agricultural production. Credit disbursement is positive impact. Other variable is dependent in agricultural production. Credit is one main variable, if credit disbursement is increase than agricultural production and increased.

4.10.2 Coefficient of determination R^2

By the same analogy, in multiple regression also the total variation is split up into two parts viz the total variation is split up in to two parts viz: explained variation and unexplained variation on notation.

$$\Sigma(Y - \bar{Y})^2 = \Sigma(\hat{Y} - \bar{Y})^2 + \Sigma(Y - \hat{Y})^2$$

$$\Sigma Y^2 = \Sigma \hat{Y}^2 + Ee^2$$

Since coefficient of multiple determinations show the percentage of total variation of dependent variable (Y0 explained by the regression equation. It can be defined as

$$R^2 = \frac{Ess}{Tss}$$

The value of R^2 ranges from 0 to 1. If the value of R^2 approaches to 1, the regression plane thus estimated is a good fit and if it approaches to '0' it implies the bad fit. It is because increasing R^2 means explaining more of the total variation by regression plane.

In this equation the R^2 value is 0.982021. The value is between 1 to zero so the value is positive in agricultural production.

Adjusted coefficient of multiple determination \bar{R}^2

In multiple regression analysis the number of explanatory variable can range from 2 to k the formula for coefficient of multiple determinations is

$$\bar{R}^2 = \frac{b_1 \sum x_1 y + b_2 \sum x_2 y + \dots + b_n \sum x_n y}{\sum y^2}$$

$$\frac{Rss}{Rss + Ess} = 1 - \frac{Ee^2}{\sum y^2}$$

It is obvious that the value of numerator increase with the additions of new explanatory variable. It finally affects the precision of result and decision made on the basis of R^2 . Hence the reliability of R^2 declines. So the adjusted R^2 is calculated to come up with this problem.

$$\bar{R}^2 = 1 - \frac{\text{un explained variation / d.f. unexplained}}{\text{Total variation / d.f. for total variation}}$$

The value of $\bar{R}^2 = 0.977118$

The \bar{R}^2 value is declines the R^2 value so the \bar{R}^2 is reliability. So, the independent variables is positive in dependent variable. So the credit disbursement positive impact in agricultural production

4.10.3 T- test interpretation

In case of large samples the sampling distribution of statistics are approximately normal and close to population values. Hence, we can substitute the sample mean in place of population mean and similarly standard deviation for the calculation of standard error in case of large sample. For small, the standardized statistic $\left[\frac{t - E(t)}{S - E(t)} \right]$ may not follow the normal distribution. So we cannot apply z-test in such case. For small sample, we apply t-test in general a sample is said to be small. If the sample size less or equal to 30 i.e. $n \leq 30$ T-test of dependent and independent value is below.

$$Y = 0.085432 - 1.90301 x_1 + 0.414095 x_2 + 8.281972 x_3$$

Show the value y is total agricultural output x_1 is irrigation facilities area of ha, x_2 is total cultivated land in thousand in ha and x_3 is credit disbursement in million. Irrigation facilities is vary low land. So its negative impact in agricultural production. The credit disbursement is satisfactory because its value is positive in T-test.

4.10.4 Analysis of Cobb-Douglas Production Function

Cobb- Douglas production function is calculated for the purpose of analyzing impact of agricultural credit in agricultural production. The following Cobb-Douglas production function is obtained as

$$Y = A X_1^{a_1} \cdot X_2^{a_2} \cdot X_3^{a_3}$$

$$Y = 0.43987 X_1^{-0.10263} \cdot X_2^{0.636425} \cdot X_3^{0.770014}$$

Where 0.43987 is the efficiency parameter which includes management, technology etc. and $-0.10263, 0.636425$ and 0.770014 indicate output elasticity's of X_1, X_2 and X_3 respectively.

As the sum of output elasticity's is greater than unity the function exhibits increasing returns to scale. In this case total output will not be sufficient to pay each factor according to its marginal productivity. Such as problem is called "adding up problem"

The implication of this result is that irrigation facilities is not properly suited with cultivated land. Cultivated land must be increased in greater proportion that the irrigation facilities. Total cultivated land is increased proportion but an irrigation facility is decreased proportion. So the credit disbursement increased greater proportion that the cultivated land proportion credit disbursement is highly provided. It is positive impact in agricultural productions so the credit is vital role.

Table No. 4.12: Regression Result Dependent variable Y=Total agricultural output

Variables	Coefficient	T-values
A (constant)	0.43987	0.085432
X ₁	-0.10263	-190391
X ₂	0.636425	0.414095
X ₃	0.770014	8.281972
Adjusted R squared	0.977118	
\bar{R} Squared	0.977118	

Given model for the time period 1993-2008 is estimated using regression model in agricultural production. All the coefficient of the model are highly significant. Cultivated land and credit disbursement affect agricultural production positively but irrigation facilities is negative effect. Adjusted R- squared for the model is 0.98202, which means log of the variables included in the model are able to explain 98 percent variation of the log of agricultural production over the period 1993-2008. The coefficient of the variable credit disbursement is 0.770014 which implies that for a percent change in agricultural production of cultivated area hectored agricultural output per cultivated million hectored increases by 77 percent. Another variable which has positive impact on the agricultural production is net irrigated area irrigation facilities is negative impact. The coefficient of the variable irrigation facilities– 0.10263 which implies that for a percent change in credit per cultivated million hectored agricultural output in million decreases by 10 percent. It is negative impact in agricultural production.

CHAPTER V

SUMMARY CONCLUSION AND RECOMMENDATION

5.1 Summary and Conclusion

In the developing country like Nepal, agriculture plays a significant role to remove the vicious of poverty. Economic development should be obtained by agricultural development. An increment in agriculture production to accumulate capital by lowering production cost than its price, by using its inputs in other sector such as industrial sector and by reducing the quantity of the import of agricultural goods. Agricultural sector provides the backbone for the development of the Nepalese economy. Also it contributes the employment opportunities, basically, for the unskilled manpower and thus reduces unemployment, one of the biggest problems of the national.

The main problem in the agriculture is related not only to agricultural finance but also with other non monetary factor such as inputs lack of technical knowledge and land lessens. Therefore, all these factors should be taken into consideration while introducing modernization process in this sector. In our country credit is one of the indispensable factor for the agricultural development of the country. Only the personal saving does not meet financial need for farmers. Financial institution helps to meet the need of the farmers not sufficient. Therefore, the farmer who has very small capacity to save due to their low level of income, credit becomes indispensable for them to purchase modern farm machinery, improved seeds and fertilizers, to develop the market oriented agro- business and so on. Agricultural development leads to rise in income which further leads towards rise in saving and rise in investment. In Nepal ADB/N is engaged in all sorts of agricultural activities through out country. It is the prominent and major financial institution providing agricultural credit and technical support in order to improve the socio- economic status of the farmers. The analysis of secondary data provided by ADB/N show that magnitude of outstanding loan has been increasing.

Credit disbursement has increased more than threefold in 15 years with annual growth of Rs.1002.95 million. Purpose wise loan distribution shows marketing at top

followed by livestock. Due to urbanization demand for marketing loan is increasing. Increasing participation of private sector in dairy production and other production related to livestock has attracted livestock loan portfolio. Less priority is given to horticulture, irrigation, tea and coffee. So 60 percent of total credit delivered is covered by marketing, livestock and agro- industry. It shows purpose wise loan distribution is unbalanced. Most potential purpose from lending point of view is market loan purposes like Agri-tools and irrigation and Tea/ coffee cultivation show declining trend. Investment in cereal crops has been shifted to cash crops to increase demand of cash crops. Term-wise credit delivery reflects that short and medium term portfolios cover more than 90 percent of total loan investment. Performance of long term portfolio is overshadowed by small credit compared to short and medium term portfolio due to policy of ADB/N to emphasize on short and medium term loan. Increasing percentage of outstanding loan shows that loan collection side is weak short- term loan has been recorded highest repayment rate. There is notable reduction of outstanding loan in irrigation and housing. This is not due to improvement in recovery situation but due to decrease in investment of loan for irrigation. Loan investment for irrigation decreased due to withdrawal of aid by government to farmer for irrigation development. The loan distribution of ADB/N has grown significantly which shows that increasing demand for agricultural credit is supplied by ADB/N in a great deal. It provided about 75 percent of total institutional credit. To develop agriculture, agro-industry, livestock, horticulture, cereal and cash crop farming all fields be encouraged. But credit distribution of ADB/N is not balanced. Providing credit for only one purpose can't increase agricultural production. Though financial system of ADB/N has widened they have been concerned trading only in the urban area. Field offices nearer from the head office and facilitated with transport and market services have supplied the highest share of loan. Physical facility, transportation communication etc. have affected loan distribution pattern of ADB/N.

Agricultural credits show impact in agricultural production. It is a vital role in food crops, cash crops production. Although about 90 percent of cropped area is utilized for food grain production and the remaining is devoted to production of cash crops such as sugarcane, jute and cotton. Considering the future rapid growth of population, it is necessary to devise an appropriate strategy for formulating of effective policy for

raising the production of food and non-food crops so that the economy may be able to register a satisfactory rate of growth.

It is a fact that Nepal today does not produce sufficient quantity of food grains for supporting its growing population and has per force required to import necessary quantity of cereals and pulses to bridge the existing gap between its demand and supply. It goes without emphasizing the gap that has eventually to be overcome by attempting to produce in course of time basic inputs that are needed to raise agricultural production. It needs no mention that these inputs are produced within the country, which they are presently importing from India and other South Asian countries.

It is widely accepted that agricultural credit is a paramount source of boosting up agricultural production. Main source of agricultural credit is agricultural development bank. It is supplying almost more than 70 percent of total institutional credit as production credit and investment credit for the country as a whole. It may be mentioned here that this bank was created in order to institutionalize agricultural credit at the national level and incidentally to reduce the farmer borrowers dependence on land lords and moneylenders of late, the commercial banks have also started to supply a small part of their lendable resource for the benefit of farmers as far as production credit is concerned in pursuance of the policy decision of the Nepal Rastra Bank.

In this study brings out the fact that large and medium sized farmers have pocketed the major share of institutional credit while the small and marginal farmers are still largely dependent on the traditional sources. The study also reveals that the growth rate of the population outstrips that of food grains production. If the rapid rise in population is not checked in future, there is bound to be shortage of food grains in days come. It needs no specific mention that rising pressure of population on cultivable land continues to reduce per capita saving and capital formation which in turn, shall adversely affect the pace of overall economic growth of the country. Besides the size of holdings is not only small but fragmented, too. As a consequence, the farmers are forced to practice intensive farming in the country more or less, in all the regions of the country.

Although agriculture credit constitutes the bulk of total lendable funds available for the agricultural sector in Nepal, it has not led to an appreciable rise in total agricultural output. At present, there exists a big gap between the current demand for and supply of farm credit in Nepal. Credit disbursement percent in Nepal is some time increasing and some time decreasing. Its impact on agricultural production is positive. Agricultural credit disbursement has a positive impact on the agriculture sector. But other factors are not available. Irrigation facilities in our country are decreasing, which has a negative impact on agricultural production. The result of the Cobb-Douglas regression model is as follows:

$$\ln Y = 0.43987 + \ln 0.1026x_1 + \ln 0.636425x_2 + \ln 0.770014x_3$$

$$R = 0.9909$$

$$R_2 = 0.982021, \bar{R}^2 = 0.97718$$

$$\text{Standard error} = 0.032828 \text{ and}$$

T-test value is

$$T = 0.085432 - 1.90391x_1 + 0.414095x_2 + 8.281972x_3 \text{ respectively.}$$

This value shows that the impact of agricultural credit on agricultural production is positive.

Agricultural credit disbursement trend has increased by Rs.1002.95 million. Over the study period, but its loan collection trend is low than the total loan outstanding trend. Credit disbursement is dependent on other factors of variable other independent variable irrigation facilities very low. It has a negative impact on agricultural production. In our country, there is sufficient water but irrigation facilities are very low in cultivated land. The main cause is lack of technology, lack of educated men power, lack of capital etc. So, considering the future rise in demand for farm credit for which we have made projections up to the year, we have also recommended certain specific measures which are being highlighted later in this very chapter. Besides this, the study has taken up with certain hypotheses which have been confirmed in the study.

Even today, the banking sector has not been able a significant change is the existing system of farm credit. This ineffectiveness has been highlighted else where in this study. In addition, we have also discover some important constraints in their working, such as inadequacy of staff as well as supervisors ineffective monitoring lack of co-ordination between major lending agencies and the bottlenecks arising out of language used in the application forms. The overall poor working of institutional lenders has led to chronic mounting overdues. On the other hand, the average farmers and their own ignorance of credit schemes followed by lenders. It would therefore be pertinent to highlight the major government policies which are designed to overcome the existing drawback in institutional credit system.

The fact that credit access had a higher impact on the irrigation sector among credit constrained justifies the need for credit targeting to achieve low economic efficiency in this fields. Poverty in rural Nepal is widespread and deep. The poorest of the poor among rural farm households need to be targeted through safety, no schemes – not credit in order to enable.

These rural to adopt higher value crops while ensuring food security after droughts or other natural disaster. Hence, credit is only of relevance to a smaller set of rural households in Nepal. Other constraints such as extreme vulnerability and poverty, or lack of market access and road infrastructure, need to be addressed by other policy instruments.

5.2 Recommendations

From this study, it is found that there occurs the various types of problem in providing the credit facilities to rural agricultural people. A large number of factors are responsible for bosting up the problem. So immediately, it is necessary to reduce and if possible, alleviate it. In this section, some recommendations are put forward:

- ❖ Most of the villages in Nepal depend on agricultural sector. So it is necessary to increase the productivity in agriculture sector. For this agricultural Infrastructure like irrigation, chemical fertilize, improved seed and other facilities should be provided and intensive agricultural practice and multiple cropping system should be adopted through the ADB/N.

- ❖ ADB/N should expand the disbursement market to more functional and geographical area. Due to political conflict of country and other problems, branches and sub branches of ADB/N have been decreased. ADB/N should widen its service at every nook and corner of the country covering small form size group which helps to reduce regional imbalance of country. Because without balanced regional economic development national economic development is matter of far behind. To cover loss in coming to non-commercial areas, ADB/N can utilize urban resources through commercial banking programme.
- ❖ ADB/N should not over emphasis on collateral requirements as it is proved that, stress on collateral requirement benefits big farmers resulting benefit derived by small farmer very low. Hence it is suggested that the policy of ADB/N should be to provide credit to small farmers on easy terms.
- ❖ Collection of loan should be made at convenient time especially during harvesting period. Strict supervision should be made at the time of sowing and harvesting season to ensure proper utilization and timely recovery.
- ❖ Regular monitoring and supervision should be implemented for the efficiency in transaction. Bank should take legal action against them who do not repay loan in spite of persuasion methods to recover loan.
- ❖ Independent investigation department is necessary to investigate misuse of loan and provide creative suggestions to run bank smoothly.
- ❖ Bank employees should be made further hardworking and efficient through sound training programmer.
- ❖ Farmer living in for flung mountainous regions especially the high mountains need to be educated with regard to the essentials and merits of different agricultural financing schemes. In this concertino, it is advisable for the banks to hold loan meals, seminars and symposia for time to time in select centers where influential representatives of various farmers – groups may be invited so as to make these schemes widely publicized among the farmer borrowers as a class. In addition; brochers highlighting the main features of the different

schemes may be got printed in local dialect and should be distributed to the farmers through these representatives.

- ❖ In order to accelerate the decentralization process at branch level, the Nepal Rastra bank is advised to issue appropriate guidelines for opening additional branches in case of agricultural development bank and commercial banks at new centres which it may identify.
- ❖ Furthermore, the annual credit need of borrower should be assessed in advance of the agricultural season for which credit is required and sanctioned in advance of the arrival of different season, thereafter, it may be entered into the pass-book of the borrower concerned so that it is promptly advanced to him on the eve of the arrival of a particular season.
- ❖ The residents of hills and mountains who live on their own farms, far away from the towns and villages may be covered by the institutional agencies in order to provide them credit facilities for their agricultural needs. It may be a worthwhile step if this is done by setting up mobile branches whose area of operation may be spelled where so such a branch becomes operative functionally. It depends upon the existence of the terrain, road-network and communication facilities of different area. The use of well equipped mobile branches mounted on strong and sturdy vehicles can be suggested.
- ❖ Generally, agriculture provides seasonal unemployment. The subsidiary employment and benefits during off-farming seasons for the present should be provided through the establishment and provision of agricultural infrastructures. For this the access of agricultural financing should be enlarged.
- ❖ Traditional agricultural system should be discouraged and agricultural modernization in modern farming system should be introduced.
- ❖ Marketing facilities should also be taken as subsequent measures after providing micro-credit.

- ❖ Transportation facilities should be created. It plays a key role to reduce the problems of agriculture both directly and indirectly and to boost the standard of living poor.
- ❖ The bank should charge low rate of interest for agricultural sectors and financial institutions must give confidence to the farmers that they need not go to village money lenders for loan at the time of necessity.
- ❖ In plan period to give first priority in agricultural and the government takes in new policy about agricultural production.
- ❖ Nepal is rich in water resources, yet only 44 percent of total arable land is found to have irrigational facilities long – run planning for irrigation is needed. For this ADB/N should do long – term investment in irrigation.
- ❖ For the sake of future prospect long – run economic planning is needed. Long – run economic planning needs long term credit. It doesn't mean that short – run planning is not necessary. ADB/N should provide credit in balanced way which would help to gain sound economic development. If there is shortage of longer term credit fund in ADB/N refinancing from other institution and government should be done
- ❖ Because of degrading situation a safe and high yielding project should be financed in proper places.

As there is limitation of resource and time for the present researcher and this study is confined, it cannot fulfill all requirements therefore, more research should be carried out in the future in order to assess the other impact of the ADB/N agricultural credit program and possible future roles for the entire economic development.

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ANNEX

Calculation for the trend value of slope of regression line

Regression line; $Y = a + bx$

a = Intercept

b = slope

The trend or slope can be calculated as

$$b = \frac{n \sum xy - (\sum x)(\sum y)}{n \sum X^2 - (\sum x)^2}$$

In 1993/94 to 2007/08 Disbursement of loan in foods Grans and cash crops production

We know that, slope of line

X	Y	X²	Xy
1	811.46	1	811.46
2	894.8	4	1789.60
3	1015.6	9	3046.80
4	993.6	16	3974.40
5	1170	25	5850.00
6	1465.9	36	8795.40
7	1756.3	49	12294.10
8	1913.2	64	15305.60
9	1891.9	81	1709.10
10	2121.5	100	21215.00
11	1820.1	121	20021.00
12	1956.1	140	23473.20
13	1799.5	169	23393.50
14	3630.3	196	508242.00
15	4590 (24.77)	225	68850.00
$\sum x = 27830$	$\sum y = 27830.26$	$\sum x^2 = 1240$	$\sum xy = 261353.46$

$$b = \frac{n \sum xy - (\sum x)(\sum y)}{n \sum X^2 - (\sum x)^2}$$

Where $n=15$, $\sum x = 120$, $\sum y = 27830.26$, $\sum xy = 261353.46$

$$b = \frac{15 \times 261353.46 - (120)(27830.26)}{15 \times 1240 - (120)^2} = 138.25$$

Hence the slope value or trend value of food Grains cash crops is 138.25 during the period of 1993/94 to 2007/08.