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## CONTENTS

Sr. No.	TITLE & NAME OF THE AUTHOR (S)	Page No.
1.	<b>STUDENTS' PERFORMANCE IN SOCIAL STUDIES AS CORRELATES OF MORAL VALUES AND PERCEPTION IN SELECTED SECONDARY SCHOOLS</b> <i>DR. EMMANUEL OLUSOLA ADU, EKIMA TINA SALAKO &amp; IFEOMA R. EZE</i>	1
2.	<b>COMMITMENT AND MOTIVATION OF AIDED COLLEGE TEACHERS IN TAMIL NADU</b> <i>DR. K. CHANDRASEKARAN &amp; SUBRAMANIAN CHANDRAN BABU</i>	5
3.	<b>CORPORATE FINANCE DEVELOPMENT THROUGH INSTITUTE INTERACTIONS IN SERVICE AND NON SERVICE SECTORS, ETHIOPIA</b> <i>DR. M MOSES ANTONY RAJENDRAN</i>	13
4.	<b>PROJECT MANAGEMENT PRACTICE IN PUBLIC SECTOR</b> <i>FAKHRADDIN MAROOFI &amp; SAMIRA DEHGHAN</i>	15
5.	<b>AN ANALYSIS ON THE RESPONDENTS PERCEPTION OF THE RECRUITMENT AND SELECTION PROCESS AND ITS EFFECT ON THE PERFORMANCE OF EMPLOYEES IN THE MICRO- FINANCE INSTITUTIONS IN RWANDA</b> <i>MACHOGU MORONGE ABIUD, LYNET OKIKO &amp; VICTORIA KADONDI</i>	19
6.	<b>ORIGIN AND EVOLUTION OF CORPORATE OWNERSHIP IN JAPAN: A HISTORICAL REVIEW</b> <i>MOHAMMED MEHADI MASUD MAZUMDER</i>	25
7.	<b>INTERACTION OF STOCK MARKET WITH MACROECONOMIC VARIABLES: A STUDY OF KSE 100 INDEX PAKISTAN</b> <i>SHAHZAD KHAN, NIAMAT ULLAH &amp; SHAHZAD ZEB</i>	32
8.	<b>TOWARDS AN INTEGRATED CONCEPTUAL MODEL ON TOURISM COMPETITIVENESS: DOES CLUSTERING WAY FORWARD?</b> <i>IMALI N. FERNANDO</i>	36
9.	<b>EFFECTS OF INDIRECT SOURCES OF ENERGY ON AGRICULTURAL PRODUCTIVITY IN INDIA</b> <i>DR. BIDYADHAR MAJHI &amp; AWADHESH KUMAR</i>	42
10.	<b>THE PROSPECTS AND CHALLENGES IN RURAL MARKETING WITH REFERENCES TO TWO WHEELERS - A STUDY OF KARAD TALUKA OF SATARA DISTRICT</b> <i>DR. H. G. ABHYANKAR &amp; S. N. JAGADALE.</i>	45
11.	<b>A STUDY ON AWARENESS OF SOCIAL SECURITY FOR MIGRANT WORKERS IN INDIA</b> <i>S PRAKASH RAO PONNAGANTI, M. MURUGAN &amp; DR. K.P.V. RAMANA KUMAR</i>	48
12.	<b>CORPORATE ENTREPRENEURSHIP - A BUSINESS STRATEGY</b> <i>C. S. RAMANIGOPAL, G. PALANIAPPAN &amp; G. MURUGESAN</i>	51
13.	<b>DETERMINANTS OF REPAYMENT IN AGRICULTURAL CREDIT IN COIMBATORE DISTRICT</b> <i>DR. S. GANDHIMATHI, DR. P. AMBIGADEVI &amp; K. R. GOMATHI</i>	55
14.	<b>FINANCES OF DECS OF CONVENTIONAL UNIVERSITIES IN ANDHRA PRADESH - AN EVALUATION</b> <i>DR. G. VENKATACHALAM &amp; P.MOHAN REDDY</i>	60
15.	<b>A STUDY OF SOCIO - ECONOMIC VARIABLES FOR TOOTHPASTE BRANDS IN INDORE CITY</b> <i>VISHAL SONI &amp; DR. ANAND SAPRE</i>	65
16.	<b>A REVIEW OF ECONOMIC AND FINANCIAL INCLUSION IN NORTH EASTERN STATES OF INDIA</b> <i>DR. SANJAY TUPE</i>	70
17.	<b>THE EFFECTIVENESS OF MICRO FINANCE INSTITUTIONS ON SOCIO-ECONOMIC DEVELOPMENT OF WOMEN IN KARNATAKA</b> <i>DR. ANURADHA.PS</i>	74
18.	<b>A STUDY OF RELATIONSHIP BETWEEN S&amp;P CNX NIFTY AND EXCHANGE RATE</b> <i>SAURABH SINGH &amp; KIRTI LALWANI</i>	78
19.	<b>SELF HELP GROUPS IN INDIA: AN ANALYSIS</b> <i>DR. MD MOAZZAM NAZRI</i>	82
20.	<b>ANALYSIS OF PRE &amp; POST LIBERALISATION SCENARIO IN EDIBLE OILSEEDS SECTOR IN INDIA</b> <i>DR. SATYA PRASAD VK</i>	87
21.	<b>RURAL TOURISM: A PREVENTIVE WEAPON OF SINKING URBANIZATION AND RURAL ECONOMIC DEVELOPMENT</b> <i>DR. BIDYUT JYOTI BHATTACHARJEE</i>	95
22.	<b>SMEs RISING IN INDIA: AN OVERVIEW</b> <i>BARNASREE CHATTERJEE</i>	100
23.	<b>EVOLUTION OF PUBLIC DISTRIBUTION SYSTEM IN INDIA</b> <i>DR. P. CHENNAKRISHNAN</i>	105
24.	<b>STRATEGIC FACTORS FOR RURAL TOURISM SUSTAINABILITY</b> <i>AASIM MIR &amp; SHAFQAT AJAZ</i>	110
25.	<b>A STUDY ON ENHANCING EFFICIENCY OF UNORGANIZED POWERLOOM SECTOR WITH SPECIAL REFERENCE TO POWERLOOM SECTOR IN INDIA</b> <i>P. S. GURUMURTHY &amp; DR. VASANTI C IYER</i>	113
26.	<b>THE ROLE OF MAHATMA GANDHI NATIONAL RURAL EMPLOYMENT GUARANTEE SCHEME IN POVERTY ALLEVIATION IN INDIA</b> <i>DR. R. MUTHUSAMY</i>	119
27.	<b>CHANGING PARADIGM AND HUMAN RESOURCE DEVELOPMENT: A CASE STUDY OF TATA MOTORS</b> <i>RICHA NANGIA</i>	124
28.	<b>TRADE INDUCED EMPLOYMENT FUNCTION AND EMPLOYMENT MULTIPLIER: A CASE STUDY IN INDO-MYANMAR BORDER TRADE</b> <i>MAYENGBAM LALIT SINGH &amp; DIPALI BOSUMATARI</i>	128
29.	<b>FDI POLICIES OF INDIAN GOVERNMENT SINCE ECONOMIC REFORMS – AN ANALYSIS</b> <i>SIRAJ-UL-HASSAN RESHI</i>	133
30.	<b>ICT AND ECONOMIC GROWTH: THE VARIETY OF DIGITAL DIVIDES LESSONS FROM SOUTHERN AND EASTERN MEDITERRANEAN</b> <i>VAHID RANGRIZ</i>	140
	<b>REQUEST FOR FEEDBACK</b>	146

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**DETERMINANTS OF REPAYMENT IN AGRICULTURAL CREDIT IN COIMBATORE DISTRICT****DR. S. GANDHIMATHI****ASST. PROFESSOR OF ECONOMICS (SR. GRADE)****AVINASHILINGAM INSTITUTE FOR HOME SCIENCE & HIGHER EDUCATION FOR WOMEN  
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COIMBATORE****K. R. GOMATHI****RESEARCH SCHOLAR****AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN  
COIMBATORE****ABSTRACT**

*The study finds that there was a good recovery performance on the part of the medium farmers as compared to other categories of farmers. It was so because the medium farmers were not the wilful defaulters and they were prompt in their repayment to some extent. The size of land holdings, size of family, education, farm income and age of the farmer were independent from the repayment of loan. The discriminant analysis reveals that during the study period, the land size emerged as the dominating factor that influences the amount of recovery. In the regression analysis, the amount of credit and net farm income emerged as significant variables in explaining the variations in the amount of recovery. The net farm income and amount of credit had a positive impact on the amount of recovery. It implies that higher the amount of credit and farm income, higher will be the amount of recovery and vice versa.*

**KEYWORDS**

Agriculture credit, Coimbatore.

**INTRODUCTION**

**T**he rural credit market appears to be confronted with a paradox. The informal sources of finance, be they local money lenders, landlords, traders, etc., charge more than 20% rate of interest, often keep land as collateral against loan and have a very high recovery rate. On the other hand, rural financial institutions (RFIs) charge almost half of this interest rate, do not take land as collateral for most of the crop loans, and still face high defaults. Where and how rural financial institutions have gone wrong? From the reports of several committees and Task forces on rural credit, it appears that the RFIs, with the sole objective of eliminating informal finance through moneylenders, have always been allowing leniency in their financial policies. The result is that while informal finance still holds significance in the rural areas<sup>1</sup>, the RFIs, especially cooperatives are heading towards a state of financial unsustainability. The main factors behind financial unsustainability of the RFIs are stated to be overwhelming overdues or non-performing assets, high transaction cost, low financial margins and regulated interest rates (Devaraja, 2011).

The average loan recovery of SCBs and DCCBs as on 30 June 2009 improved marginally to 92 and 72 per cent from 85 and 56 per cent, respectively, over the previous year. In absolute terms, loan recovery of SCBs improved from Rs.26,433.54 crore to Rs.33,893.73 crore. At the DCCB level, it increased from Rs.39,544.40 crore to Rs.57,326.77 crore. The average loan recovery of SCARDBs and PCARDBs, as on 30 June 2009, declined to 40 and 40.3 per cent from 50 and 42 per cent, respectively, over the previous year. In absolute terms, loan recovery of SCARDB and PCARDB declined to Rs.3,860.44 crore and Rs.2,842.47 crore, as on 30 June 2009, from Rs.5,367.81 crore and Rs.3,190.10 crore, respectively, over the previous year. (NABARD, 2010).

Bayesian analysis and Discriminant analysis were used for analyzing the Probability Contribution of the selected socio-economic variables to the amount of recovery and to discriminate the borrowers into defaulters and non-defaulters.

The findings of the study show that there was a good recovery performance on the part of the medium farmers as compared to other categories of farmers. The discriminant analysis reveals that during the study period, the land size emerged as the dominating factor that influences the amount of recovery. In the regression analysis, the amount of credit and net farm income emerged as significant variables in explaining the variations in the amount of recovery. The net farm income and amount of credit had a positive impact on the amount of recovery. It implies that higher the amount of credit and farm income, higher will be the amount of recovery and vice versa.

**DETERMINANTS OF REPAYMENT IN AGRICULTURAL CREDIT IN COIMBATORE DISTRICT**

Agriculture plays a crucial role in the development of the Indian economy. It accounts for about 19 per cent of GDP and about two thirds of the population is dependent on the sector. The importance of farm credit as a critical input to agriculture is reinforced by the unique role of Indian agriculture in the macroeconomic framework and its role in poverty alleviation. Recognising the importance of agriculture sector in India's development, the Government and the Reserve Bank of India (RBI) have played a vital role in creating a broad-based institutional framework for catering to the increasing credit requirements of the sector. Agricultural policies in India have been reviewed from time to time to maintain pace with the changing requirements of the agriculture sector, which forms an important segment of the priority sector lending of scheduled commercial banks (SCBs) and target of 18 per cent of net bank credit has been stipulated for the sector. The Approach Paper to the Eleventh Five Year Plan has set a target of 4 per cent for the agriculture sector within the overall GDP growth target of 9 per cent. In this context, the need for affordable, sufficient and timely supply of institutional credit to agriculture has assumed critical importance (Golait, 2007).

The rural credit market appears to be confronted with a paradox. The informal sources of finance, be they local money lenders, landlords, traders, etc., charge more than 20% rate of interest, often keep land as collateral against loan and have a very high recovery rate. On the other hand, rural financial institutions (RFIs) charge almost half of this interest rate, do not take land as collateral for most of the crop loans, and still face high defaults. Where and how rural financial institutions have gone wrong? From the reports of several committees and Task forces on rural credit, it appears that the RFIs, with the sole objective of eliminating informal finance through moneylenders, have always been allowing leniency in their financial policies. The result is that while informal finance still holds significance in the rural areas<sup>1</sup>, the RFIs, especially cooperatives are heading towards a state of financial unsustainability. The main factors behind financial unsustainability of the RFIs are stated to be overwhelming overdues or non-performing assets, high transaction cost, low financial margins and regulated interest rates (Devaraja, 2011).

The average loan recovery of SCBs and DCCBs as on 30 June 2009 improved marginally to 92 and 72 per cent from 85 and 56 per cent, respectively, over the previous year. In absolute terms, loan recovery of SCBs improved from Rs.26,433.54 crore to Rs.33,893.73 crore. At the DCCB level, it increased from Rs.39,544.40 crore to Rs.57326.77 crore. The average loan recovery of SCARDBs and PCARDBs, as on 30 June 2009, declined to 40 and 40.3 per cent from 50 and 42 per cent, respectively, over the previous year. In absolute terms, loan recovery of SCARDB and PCARDB declined to Rs.3,860.44 crore and Rs.2,842.47 crore, as on 30 June 2009, from Rs.5,367.81 crore and Rs.3,190.10 crore, respectively, over the previous year (NABARD, 2010).

It will be useful to examine the magnitude of overdues in the agricultural sector that are likely to be written off. The present study is a step in this direction.

## OBJECTIVES

The following are the specific objectives of the study.

1. To assess the recovery performance of farm loan among farm households.
2. To identify the factors determining repayment

## METHODOLOGY

The study was conducted in Coimbatore district. Data for the study were collected from primary source. Interview schedules were used to collect information on the socio-economic profile of the farmers, the amount borrowed, amount repaid, overdues, landholding size, farm and family expenses, farm income, non-farm income and total variable cost. A pilot study was conducted to identify the gaps in the interview schedule. On the basis of the observation during the pilot study, the schedule was modified and the final survey was conducted with the restructured schedule.

### SELECTION OF SAMPLE

A two – stage random sampling procedure was followed in selecting the sample of borrowed farmers. Pannimadai village was selected as in this village agriculture is intensively financed both in terms of amount of agricultural advances and the number of farm families financed. The banks located near the village namely The Union Bank of India, Canara Bank, Indian Overseas Bank and Corporation Bank had been approached to collect information of the list borrowers / defaulters and their addresses. The co-operatives, the land development banks and the farmer's credit societies had been omitted, as they were not willing to provide the list of borrowers. Out of the 150 borrowers in the list provided by the four banks branches, 50 were selected randomly. It was found that, in the selected area, 9 were large farmers with more than five hectares, 8 were medium farmers with four to five hectares, 19 were semi-medium farmers with two to four hectares and 14 belonged to small and marginal farmer's category with less than two hectares of operational holdings.

### ANALYTICAL TECHNIQUES

A critical analysis of the methodologies adopted in the studies on recovery and overdues in agricultural credit had revealed the extensive application of the regression analysis (multi variable) to estimate the relationship between socio-economic characteristics of the borrowed farmers and the amount of repayment. A very few analytical studies had used, Bayesian analysis and Discriminant analysis for analyzing the Probability Contribution of the selected socio-economic variables to the amount of recovery and to discriminate the borrowers into defaulters and non-defaulters. Hence the study is concentrated on the above analytical tools.

The specification of the econometric models is as under.

1. To analyse the impact of the selected socio-economic variables in the recovery performance, a regression of the form.

$$Y = a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 + a_7X_7 + U$$

Was used.

Where,

Y – Amount repayment (in Rs.)

X<sub>1</sub> – Amount of credit (in Rs.)

X<sub>2</sub> – Landholding size (in hectares.)

X<sub>3</sub> – Consumption expenditure (in Rs.)

X<sub>4</sub> – Capital expenditure (in Rs.)

X<sub>5</sub> – Farm income (in Rs.)

X<sub>6</sub> – Non-farm income (in Rs.)

X<sub>7</sub> – Total variable cost (in Rs.)

U – Random term

### DISCRIMINANT ANALYSIS

To identify the factors discriminating the defaulters in to wilful and non-wilful, discriminant function was applied. A linear discriminant function of the form.

$$Z = L_1X_1 + L_2X_2 + L_3X_3 + L_4X_4 + L_5X_5 + L_6X_6 + L_7X_7 + U$$

was used.

Z = Total discriminant score for defaulter and non-defaulters.

X<sub>1</sub> – Amount borrowed (in Rs.)

X<sub>2</sub> – land holdings (in hectares)

X<sub>3</sub> – Consumption expenditure (in Rs.)

X<sub>4</sub> – Capital expenditure (in Rs.)

X<sub>5</sub> – Farm income (in Rs.)

X<sub>6</sub> – Non-farm income (in Rs.)

X<sub>7</sub> – Total variable cost (in Rs.)

### CHI-SQUARE ANALYSIS

In order to examine the association between the repaying behavior (defaulter and non-defaulter) and the socio-economic characteristics of the defaulters, chi-square test was applied. The formula for chi-square test is:

$$\chi^2 = \frac{\sum (O-E)^2}{E}$$

'O' refers to observed frequencies

'E' refers to expected frequencies

The factors in association with repaying behavior include the following

- a) Size of landholding
- b) Size of family
- c) Education of the family head
- d) Farm income
- e) Age



**BAYESIAN ANALYSIS**

To analysis the socio-economic characteristics and their probable contribution to defaulters and non-defaulters, Bayes theorem was used as an analytical model. The basic idea of Bayesian argument is that given a priori distribution for the parameter, might be the probability, for example, the posterior probabilities for a given data can be calculated. Bayesian theorem is based on the formula for conditional probability.

Let  $w_1$  and  $w_2$  be a (defaulters and non-defaulters) mutually exclusive and exhaustive events if  $(c_j)$  is another set of evens such that  $p(c_j)$  is not zero, then

$$P(w_1/c_j) = \frac{P(w_1) P(c_j) / w_1}{\sum_{i=1}^2 p(w_i) p(c_j) / w_i} \quad \text{for any } j$$

$$P(w_2/c_j) = \frac{P(w_2) P(c_j) / w_2}{\sum_{i=1}^2 p(w_i) p(c_j) / w_i} \quad \text{for any } j$$

The classification of the factors to find out the probable contribution to overdues.

**RESULTS AND DISCUSSION**

**DEMAND, COLLECTION AND OVERDUES OF CROP LOAN – CROP WISE AND FARMER CATEGORY WISE**

The demand for the crop loan was computed as the principal amount plus rate of interest. Collection is the actual amount repaid by the farmers in that period. Overdue is the difference between demand and collection. The demand, collection and overdues of crop loan are shown in Table -1.

**TABLE -1: FARMER CATEGORY WISE DISTRIBUTION OF DEMAND, COLLECTION AND OVERDUES OF CROP LOAN**

Farmer category	Demand	Collection	Overdues
Marginal	22,500	22,500	–
Small	2,61,000	86,600	1,74,400 (66.82)
Semi-Medium	3,47,625	2,25,545	1,22,080 (35.12)
Medium	4,44,375	3,56,375	88,000 (19.80)
Large	3,09,375	78,975	2,30,400 (74.47)

Note: Figures in parentheses indicate percentages.

It was observed that the amount demanded for various crops by the medium farmers was Rs.4,44,375, out of which the amount collected was found to be Rs.3,56,375 which accounted for 80.2 percent to the demand. It shows that there was a good recovery performance on the part of the medium farmers as compared to other categories of farmers. It was so because the medium farmers were not the wilful defaulters and they were prompt in their repayment to some extent.

**DEMAND, COLLECTION AND OVERDUES OF INVESTMENT LOAN – PURPOSE WISE AND FARMER CATEGORY WISE**

The demand for the year was computed as the sum of the loan amount and the interest (different rates for different purposes) calculated for the entire period of loan divided by the number of years to repay. Collection means the actual amount repaid by the farmers in that year. Overdue is the difference between demand and collection. The details regarding demand, collection overdues of investment loan are given in Table 11 and Table -2.

**TABLE -2: FARMER CATEGORY WISE DISTRIBUTION OF DEMAND, COLLECTION AND OVERDUES OF INVESTMENT LOAN**

Farmer category	Demand	Collection	Overdues
Dug well	1,21,875	74,875	47,000 (38.50)
Electric motor	3,20,000	3,06,500	13,500 (4.22)
Land development	4,25,000	3,22,900	1,02,100 (24.02)
Tractor	4,70,000	4,70,000	–
Purchase of livestock/ bullock cart	8,97,500	6,70,000	2,27,100 (25.30)
Drip irrigation	4,03,125	79,125	3,24,000 (80.37)
Fertilisers	56,250	28,250.00	28,000 (49.78)

Note: Figures in parentheses indicate percentages.

The table indicates that, the percentage of investment loan given for the purchase of livestock / bullock carts was higher and the recovery performance on the part of this purpose was 74.70 percent. The large farmers had higher magnitude for borrowings as well as higher amount of overdues for drip irrigation than other categories of farmers probably because of better social and political links.

**DETERMINANTS OF OVERDUES**

The determinants of repayment are discussed under the following heads.

1. Chi-square analysis
2. Discriminant function analysis
3. Bayesian analysis
4. Multiple-regression analysis

**1. CHI-SQUARE ANALYSIS**

In order to understand the association between the socio-economic factors across the various categories of farmers and the repayment performance stated in terms of fully repaid and not repaid, chi-square test was used. The variables namely size of land, size of family, education of the borrower, farm income and age of the farmer were selected and put into the analysis. The results of the analysis are presented in Table -3.

TABLE -3: RESULTS OF CHI-SQUARE TEST

S.No.	Variables	Calculated $\chi^2$ value	Significance of the variable
1.	Size of land	0.195	In significant
2.	Size of family	0.090	In significant
3.	Education	0.927	In significant
4.	Farm income	0.340	In significant
5.	Age	0.045	In significant

It was found that, there was no association between the repayment performance and the selected socio-economic variables since, the calculated chi-square values of all the variables were less than the theoretical value. It implies that the size of land holdings, size of family, education, farm income and age of the farmer were independent from the repayment of loan.

**2. DISCRIMINANT FUNCTION ANALYSIS**

The identify the socio-economic factors, which discriminate the farmers into non-defaulters and defaulters, the discriminant analysis was carried out by taking into account seven socio-economic variables.

Out of the 50 farmer respondents, 29 were defaulters and 21 were non-defaulters. The farmers who repay the loan are the non defaulters. The farmers who did not repay the loan are defaulters. It was assumed that certain economic factors were associated with the incidence of defaulting and non-defaulting. Those factors were credit, land holding size, consumption expenditure, capital expenditure, farm income, non-farm income and total variable cost which were put in to the discriminant analysis. The estimated discriminant function was

$$Z = 0.9727110 + .00001680584 X_1 - 0.5256592 X_2 - 0.00003596539 X_3 + 0.0002672678 X_4 - 0.0000154913 X_5 + 0.0001818495 X_6 + 0.00001373916 X_7$$

The above equation reveals that higher the level of amount borrowed, capital expenditure, non-farm income and total variable cost, larger will be the output of defaulting.

To examine the relative importance of the characteristics based on the power to discriminate between the groups, the percentage contribution of each character to the total distance measured was calculated and are shown in Table-4.

TABLE -4: RELATIVE DISCRIMINATING POWER

S.No.	Variables	Group I Mean	Group II Mean	Unstandardised Discriminating Power	Relative Discriminating Power	Relative Discriminating Power
1.	Credit ( $X_1$ )	47496.19	61862.07	0.0000017	0.0242	3.33
2.	Land holdings ( $X_2$ )	2.97	3.91	-0.5256592	0.4939	68.08
3.	Consumption expenditure ( $X_3$ )	41761.90	42844.83	-0.0000036	0.0039	0.54
4.	Capital expenditure ( $X_4$ )	23428.57	24284.48	0.0000267	0.0229	3.15
5.	Farm income ( $X_5$ )	120238.10	154689.66	-0.0000015	0.0534	7.36
6.	Non-farm income ( $X_6$ )	26000.00	20034.48	0.0000182	0.1085	14.95
7.	Total variable cost ( $X_7$ )	65150.00	78782.76	0.0000014	0.0187	2.58

From the above table, it is evident that, land holding size (68.08 percent) and non farm income (14.95 percent) emerged to be the most dominating factors. It reveals that larger the land holding size, lower will be the amount of defaulting and higher the non-farm income, higher will be amount of defaulting inferred from the sign of discriminant coefficients. Thus the discriminant analysis reveals that during the study period, the land size emerged as the dominating factor that influences the amount of recovery.

**3. BAYESIAN ANALYSIS**

The analyse the probable contribution of the socio-economic characteristics to defaulting and non-defaulting, Bayes theorem was used as an analytical model. The basic idea of Bayesian argument is that given a priori distribution for the parameter, might be the probability, the posterior probabilities for a given data can be calculated (Naidu et al., 1986).

It is required to find the posterior possibilities for non-defaulters (n1) and defaulters (n2) for the given data, when a priori probabilities P( $\theta_2$ ) of  $\theta_1$  and  $\theta_2$  are known. Each of the characteristics of the farmers were divided into two or more categories. The priori and posterior probabilities of various socio-economic characteristics were computed and is given in Table -5.

TABLE - 5: PRIOR AND POSTERIOR PROBABILITY FOR DEFAULTERS AND NON-DEFAULTERS

S.No.	Characteristics	Code No.	P( $\theta_1$ ) P(cj/ $\theta_1$ )	Prior and conditional probabilities		Posterior probabilities	
				Non-defaulter	Defaulter	Non-defaulter	Defaulter
1.	Occupation	1	0.67	0.4128	0.2539	0.6191	0.3808
		2	0.33	0.2299	0.1034	0.6897	0.3103
2.	Education	1	0.18	0.04	0.14	0.24	0.76
		2	0.38	0.16	0.22	0.43	0.57
		3	0.24	0.03	0.21	0.14	0.86
		4	0.20	0.04	0.16	0.19	0.81
3.	Size of Holding	1	0.28	0.07	0.21	0.24	0.76
		2	0.38	0.20	0.18	0.52	0.48
		3	0.20	0.04	0.16	0.19	0.81
		4	0.14	0.01	0.13	0.05	0.95
4.	Amount Borrowed	1	0.80	0.65	0.15	0.81	0.19
		2	0.20	0.16	0.04	0.79	0.21
5.	Credit Gap	1	0.40	0.11	0.29	0.29	0.71
		2	0.60	0.29	0.31	0.48	0.52
6.	Farm Income	1	0.62	0.41	0.19	0.67	0.33
		2	0.38	0.26	0.12	0.69	0.31
7.	Non-farm Income	1	0.64	0.39	0.24	0.62	0.38
		2	0.36	0.24	0.12	0.66	0.34
8.	Proportion of family members towards farm labour	1	0.46	0.24	0.22	0.52	0.48
		2	0.42	0.14	0.28	0.33	0.67
		3	0.12	0.02	0.10	0.14	0.86
8.	Proportion of family members towards farm labour	1	0.46	0.24	0.22	0.52	0.48
		2	0.42	0.14	0.28	0.33	0.67
		3	0.12	0.02	0.10	0.14	0.86
9.	Consumption Expenditure	1	0.70	0.53	0.17	0.76	0.24
		2	0.30	0.20	0.10	0.66	0.34

The analysis revealed that the posterior probability to become non-defaulter was high with the borrowers who had the sub-occupation other than agriculture (68.97 percent). Where as it was less with borrowers who had occupation of exclusively agriculture (61.91 percent). This might be due to the reason that the non-farm income may make the borrowers to have capacity to repay. If the farmers completed their higher secondary and collegiate education, the probability of defaulting was higher. It was also observed that higher the size of land holding, higher will be the probability of defaulting. If the borrower borrows larger amount, the probability of non-defaulting was less. If the magnitude of credit gap widened, the chances to become defaulter had decreased. It shows that, if the bank is able to provide more amount of credit to the farmers, there is a possibility of defaulting. Finally, it was inferred that there was higher probability of defaulting with higher number of family labour and consumption expenditure. It was so because, when the borrowers had to spend more amount on consumption, the repaying capacity of them will be reduced.

#### REGRESSION ANALYSIS

Various factors that determine the recovery performance had been identified and seven socio-economic variables namely amount of credit, size of land holding, capital expenditure, consumption expenditure, farm income, non-farm income and total variable cost were selected to study the influence of them on amount of recovery. These factors were put in the regression analysis and the results of it are shown in table-6.

TABLE -6: ESTIMATED REGRESSION COEFFICIENTS OF REPAYMENT FUNCTION

S.No.	Variables	Co-efficients
1.	a. Amount of credit ( $X_1$ )	1.717 (3.956)*
	b. Land holding ( $X_2$ )	11972.386 (-1.094)
	c. Consumption expenditure ( $X_3$ )	-0.708 (-1.046)
	d. Capital expenditure ( $X_4$ )	-1.961 (-1.438)
	e. Farm income ( $X_5$ )	0.623 (2.502)*
	f. Non-farm income ( $X_6$ )	0.128 (0.390)
	g. Total variable cost ( $X_7$ )	-0.448 (-1.543)
2.	$R^2$	0.98
3.	F Ratio	24.35*

Note: Figures in parantheses indicate 't' values

\* - Significant at 5 percent level.

It was observed from the table that, ninety eight percent of the variation in the amount of recovery was explained by the selected socio-economic variables namely amount of credit, size of land holdings, consumption expenditure, capital expenditure, farm income, non-farm income and total variable cost. Among these factors, only the amount of credit and net farm income emerged as significant variables in explaining the variations in the amount of recovery. The net farm income and amount of credit had a positive impact on the amount of recovery. It implies that higher the amount of credit and farm income, higher will be the amount of recovery and vice versa.

#### CONCLUSION

There was a good recovery performance on the part of the medium farmers as compared to other categories of farmers. It was so because the medium farmers were not the wilful defaulters and they were prompt in their repayment to some extent. The size of land holdings, size of family, education, farm income and age of the farmer were independent from the repayment of loan. The discriminant analysis reveals that during the study period, the land size emerged as the dominating factor that influences the amount of recovery. In the regression analysis, the amount of credit and net farm income emerged as significant variables in explaining the variations in the amount of recovery. The net farm income and amount of credit had a positive impact on the amount of recovery. It implies that higher the amount of credit and farm income, higher will be the amount of recovery and vice versa.

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