



## Economic evaluation of *Kisan Credit Card* scheme for smallholder farmers: An empirical study in Manipur

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Received : 20.07.2022 ; Revised : 02.11.2022 ; Accepted : 12.11.2022

DOI: <https://doi.org/10.22271/09746315.2023.v19.i1.1680>

### ABSTRACT

The present study attempted to evaluate KCC scheme being implemented in Manipur state. The study found that average amount borrowed by beneficiaries was ₹ 35,675 with interest rate 7 % per annum. Non-beneficiaries borrowed money from informal sources with interest rate of 47.4 % per annum. The study found that repayment rate was very poor for both the group with an outstanding amount of 71.03 % for beneficiary and 95.92 % for non-beneficiary group. The significant factors affecting the adoption of KCC are education, membership of Farmers' club/ SHGs, winter and summer cultivation and extension contact. High cost of cultivation and low yield were main reasons for poor repayment of loan by beneficiaries' while high household expenses and no earning in off-season were the main reasons for non-beneficiaries. The study emphasized that KCC should be made available to all eligible farmers and effective utilization is necessary to get the best yield of crop grown which will help in timely repayment of loan.

**Keywords:** Binomial logit model, Constraints, Determinants, KCC loan, Repayment, Source of credit

*Kisan Credit Card* (KCC) is one of the most popular form of institutional credit provided by financial institutions especially regional rural banks to small and marginal farmers. It is a part of policy for achieving inclusive growth by providing small loan amounts to the small and marginal farmers of the country which constitute more than 80 % of the farmer's population. Access to finance has been a critical factor for enabling people to transform their production and employment activities and to reduce poverty (Banerjee, 2001). Small institutional loans are highly valuable for the resource poor needy farmers of the country, especially for the North Eastern Hill region. Since the independence, majority of rural households are dependent on informal source of credit to meet the household and cultivation credit requirement.

The availability and access to formal/ institutional credit especially in rural areas of the North Eastern Hill region is very limited which hamper the socio-economic growth and development of the region. Though a number of improved technologies on farming and crop cultivation are developed and available, the adoption level is very less. The major reason was the poor purchasing power of the small holder farmers. To solve the problem of dependency to the informal source of credit and to deliver the agricultural credit requirement, *Kisan Credit Card* (KCC) scheme was introduced in the year 1998. It aims to provide adequate and timely credit

to the farmers with flexible and simplified procedure. This scheme was implemented by commercial banks, regional rural banks, small finance banks and cooperatives banks. Under this scheme, short-term crop loan up to ₹ 3 lakhs was provided to farmers at an annual interest rate of 7 %. From the year 2018-19 onwards, the Government of India had introduced KCC scheme for animal husbandry and fisheries in order to provide short-term working capital loans to animal husbandry and fisheries farmers. As on 31<sup>st</sup> March 2022, there were 268.71 lakhs operative KCC account in the country with a total outstanding loan amount of ₹ 4,76,283 crores (RBI Annual Report 2021-22). Burgess *et al.* (2005) stated that the enforcement of directed bank lending efforts was associated with increased borrowing from bank by the poor, particularly low caste and tribal groups.

According to report of the Internal Working Group to Review Agricultural Credit 2019, institutional sources were most preferred by agricultural households as approximately 61 % avail credit from it. But in spite of this, a significant portion, *i.e.* approximately 30 % of agricultural households avail credit from non-institutional sources, which is a cause of concern. The availability of KCC loan is a boon to the farmers of the North Eastern Hill region especially Manipur where farmers are poor and dependence on local money lender is high. It is easier to borrow money from local money

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How to cite : Singh, K. R., Singh, N. U., Singh, T. B., Tongbram, K. and Singh, I. M. 2023. Economic evaluation of *Kisan Credit Card* scheme for smallholder farmers: An empirical study in Manipur. *J. Crop and Weed*, 19 (1): 202-209.

lender as no documentation and certification are required, but it is exploitative in nature as they charge a very high interest rate. KCC is getting momentum in the state during the last five years due to the creation of large-scale awareness about the scheme and active involvement of bankers in the process. Also, the formation of a large number of farmers' club and self-help group at village level under the initiative of NABARD, ICAR, KVKs and other institutions has led to the large-scale adoption of KCC scheme in the state. Despite KCC scheme being the dominant source of short-term agricultural credit over the past decade, till date, only a limited attempt has been made to study its economic evaluation and impact. The present study is an attempt to examine the nature of adoption of KCC scheme in the state and the problems faced by farmers with regard to KCC. The present study will help administrators, policy makers, researchers and bankers/financial institutions for making future strategies and policies for bringing grassroots development through the KCC scheme.

## MATERIALS AND METHODS

The present study was conducted in valley areas of Manipur. Of the total 6 valley districts, 4 districts namely Imphal East, Imphal West, Thoubal and Bishnupur which had the highest number of KCC beneficiaries were selected. From each district 50 KCC beneficiaries were randomly selected from a cluster of two to three villages. Takhel and Sanjenbam villages from Imphal East district; Sangaithel and Touthong villages from Imphal West district; Keinou Thongthak and Keinou Thongkha villages of Bishnupur district and Salungpham, Lourebam and Laiphrakpam villages of Thoubal district were selected for primary data collection. Altogether, there were 200 beneficiary respondents. In order to compare the results, another 200 non-beneficiaries were selected, 50 from each district from the same cluster of villages. The information on age, occupation, year of experience in farming, cultivated area, amount of KCC loan received, utilization of KCC loan, repayment pattern, problem faced in KCC, etc. were collected from the respondent through village visit and personal interview. Primary data were collected during the year 2019-20. Secondary data on number of KCC issued, amount disbursed, etc. were collected from Manipur Rural Bank, Manipur State Co-operative Bank, NABARD and other published source.

### Analytical framework

Descriptive statistical analysis was used to compare the socio-economic characteristics, average loan taken and loan repayment of beneficiary and non-beneficiary

households and in other analysis wherever necessary. For examining the factors affecting loan repayment by borrower multiple linear production function regression analysis was conducted. The specification of production function employed in this study is given below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \epsilon \dots \dots \dots (1)$$

where, Y = amount of loan repaid per household (₹),  $X_1$  = age of respondent (in years),  $X_2$  = family size,  $X_3$  = education level,  $X_4$  = operational land holding (in ha),  $X_5$  = farming experience (in years) and  $X_6$  = Household Income (₹)

Binomial logit model was used to empirically analyse the factors affecting the choice for adoption of KCC loan. The study postulated that the probability of a farmer to avail KCC loan depends on the attributes like age, family size, education, land holding, ownership of livestock, membership of Farmer's club/SHG, winter and summer cultivation and extension contact. Binomial logistic regression model is employed by various researchers to examine the farmer's participation and adoption. The expression of the model used in the study is given in equation 2.

$$\ln \left( \frac{P_i}{1 - P_i} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \epsilon \dots \dots \dots (2)$$

where,  $P_i$  takes the value 1 if  $i^{\text{th}}$  household avail KCC loan otherwise 0.

Ln is the natural log

$\beta_0$  = intercept

$X_1$  = age of head of household (years)

$X_2$  = family size

$X_3$  = education level of head of household

$X_4$  = size of landholding in hectare

$X_5$  = livestock ownership

$X_6$  = Membership of SHG/ Farmers' Club (Yes = 1, otherwise = 0)

$X_7$  = winter & summer cultivation (Yes = 1, otherwise = 0)

$X_8$  = extension contact (Yes = 1, otherwise = 0)

$\beta_{is}$  = parameters to be estimated and

$\epsilon$  = random error term

### Garrett ranking technique

The Garrett ranking technique was employed to study the problems and constraints faced by the beneficiary and non-beneficiary households in repayment of borrowed amount. The percent position of each rank was worked out by using the equation given below.

$$\text{Percent Position} = 100 \left( \frac{R_{ij} - 0.50}{N_j} \right)$$

where,

$R_{ij}$  = Rank given for the  $i^{\text{th}}$  items by the  $j^{\text{th}}$  respondent and

$N_j$  = Number of items ranked by the  $j^{\text{th}}$  respondent

## RESULTS AND DISCUSSION

### *Socio-economic characteristics of farmers*

The summary of socio-economic profile of the farmers is given in Table 1. The study revealed that there exists significant difference between socio-economic characteristics among beneficiary and non-beneficiary group. Maximum of the respondents were in the age group of 41 to 50 years in both beneficiary and non-beneficiary group. Non-beneficiary group had more number of illiterate person i.e. 8.5 % compared to beneficiary which was only 5 %. In both the group, the maximum number of respondents were high school and intermediate standards. The average household size was higher for beneficiary group i.e. 5.25 persons compared to 4.76 for non-beneficiary group. Brodoloi and Das (2015) also reported higher family size in beneficiaries compared to non-beneficiaries. Similarly, the average size of land holding was higher for beneficiary 0.74 ha compared to 0.53 ha for non-beneficiary. Both the group had average of 20 years of experience in farming activity. Farming was the major occupation for both the group. Similar finding was also reported in the study conducted by Enimu *et al.* (2017) among beneficiaries of microcredit. The number of households growing winter and summer crops were higher for beneficiary group i.e. 79 % compared to only 19 % for non-beneficiaries. Most of the beneficiary household (89 % ) were members of either Farmers' Club or self-help group compared to only 18.5 % in case of non-beneficiary. There were significant differences in the level of education, family size and size of operational land holding between beneficiary and non-beneficiary group.

The total amount of money borrowed by beneficiary and non-beneficiary group is given in Table 2. All the beneficiary households avail *Kisan Credit Card* loan while 48 % of the non-beneficiary household borrowed money from informal sources. The average amount of KCC loan availed by the beneficiary was ₹ 35,675 per household while for non-beneficiaries the average amount borrowed was higher (₹ 50,781) compared to non-beneficiary. The amount of KCC loan varied from bank to bank and also depends on the scale of finance which was fixed by the bank based on the type of crop grown and size of land holding.

The availability of cheap credit with low rate of interest is very important for bringing economic growth and socio-economic development. Institutional credit is helpful to the farmers where rate of interest is very low compared to non-institutional source of credit. The

study found that there is a huge difference in the rate of interest of money borrowed by beneficiary and non-beneficiary. The average rate of interest for KCC loan was 7 % per annum while for non-beneficiaries it was 47.40 % per annum. The average outstanding amount for beneficiary group was ₹ 25,340 which account for 71.03 % of the amount borrowed compared to ₹ 47,708 for non-beneficiary which account for 95.92 % of the amount borrowed. Enimu *et al.* (2017) also found that the average rate of interest per annum for micro-credit was 40 % which range from a minimum of 8 % to a maximum of 70 %. Yadav *et al.* (2019) found that only few of the KCC holders paid their loan in the initial sixth months whereas majority repaid their loan at the end of the year. Senthilathiban *et al.* (2004) reported average amount borrowed to be ₹ 49,462 per respondent with repayment of only 28.59 % and outstanding loan amount as high as 71.41 %. Inability to repay loan can be due to adverse shock like natural calamities, no earning during off season or health shocks faced by the household.

The various sources of credit and rate of interest charged by various agencies are presented in Table 3. The study found that KCC was the only source of credit for the beneficiary group and they did not borrow from other sources. In case of non-beneficiaries, all the households borrowed money from informal source. Among the different sources of borrowing, maximum of the household i.e. 48.96 % of the non-beneficiaries borrowed money from local money lender, followed by relatives (23.96%) and friends (21.88%). The remaining 5.2 % of the households borrowed money from private banks, Self Help Group and trader. The rate of interest applicable to KCC loan was only 7 % per annum while there was very high rate of interest for borrowing from informal sources. It ranged from 24 % per annum for borrowing from SHG to 50.16 % for borrowing from local money lender. The high interest rate also had a negative effect on the repayment of credit as has been depicted in Table 2. Ramya and Gowri (2014) in their study reported that moneylender continued to play a crucial role in financing the farmers. Senthilathiban *et al.* (2004) also reported that the highest percentage of borrowing was from money lenders constituting 59 % of the total borrowing.

### *Factors influencing repayment of loan and borrowed amount by beneficiary and non-beneficiary households*

Examination of factors influencing repayment of KCC loan and money borrowed from informal sources are presented in Table 4. Linear production function was used in the regression as it is found to be better fit in term of number of significant variables and R square value. The study found that age of respondent had a

**Table 1: Socio-economic profile of beneficiaries and non-beneficiaries**

Characteristics	Beneficiary	Non-beneficiary	Difference	t-statistics(p-value)
Age of respondent (years)				0.312 (0.377)
20 to 30 years	16	20	-4	
31 to 40 years	38	48	-10	
41 to 50 years	76	69	7	
51 to 60 years	56	44	12	
Above 60 years	14	19	-5	
Level of education				12.890 <sup>#**</sup> (0.012)
Illiterate	10	17	-7	
Primary Std (5 <sup>th</sup> Std)	31	11	20	
Middle Std (8 <sup>th</sup> Std)	58	55	3	
High School and Intermediate	79	95	-16	
Graduation and above	22	22	0	
Family size (nos)	5.25 (0.134)	4.76 (0.111)	0.48	2.836 <sup>***</sup> (0.002)
Size of operational land holding (Ha)	0.74 (0.051)	0.53 (0.029)	0.24	3.486 <sup>***</sup> (0.0002)
Household having farming as primary occupation (%)	80	59	21	
Farming experience (no. of year)	20.41 (0.757)	20.55 (0.889)	-0.14	-0.124 (0.450)
Household growing winter and summer crops (%)	79	19	60	
Membership of SHGs/ Farmers' Club	178	37	141	

Sources: Author calculation based on field data.

Figures in parentheses indicate standard error.

Note: \*\*\* and \*\* denote significance at 1 % and 5 % levels respectively.

# denotes Pearson's Chi-square

**Table 2: Amount borrowed by the beneficiary and non- beneficiary households**

Particulars	Beneficiary	Non-beneficiary
Total amount borrowed (₹ )	71,35,000	48,75,000
No. of household borrowed	200 (100)	96 (48)
Average amount borrowed (₹ )	35,675	50,781
Average interest rate per annum	7%	47.4%
Total amount repaid (₹ )	20,67,000	2,95,000
Total outstanding amount (₹ )	50,68,000	45,80,000
Average outstanding amount (₹ )	25,340	47,708
Percentage of outstanding amount	71.03	95.92

Figures in parentheses indicate percentage to total

negative and significant effect on the repayment of KCC loan. As farming is a laborious job, old age farmers cannot manage the farm well. They depend on other hired farm labour to carry out the various farming activities thereby increasing the cost and expenses leading to poor repayment of loan. Ezeano *et al.* (2017) stated that aged farmers were risk verse, decline in manual strength and non-receptive to new innovations

and technologies, consequently becoming prone to loan defaults due to low farm production and productivity. Land holding, farming experience and household income had a positive and significant effect on loan repayment. As land holding increases the farm output increases, thereby increasing the income and earnings. As farming experience increases, the risk bearing capacity increases and loses are minimised, which make

**Table 3: Source of credit and rate of interest charged by various agencies**

Categories	Beneficiary		Non-beneficiary	
	No. of beneficiary	Rate of interest per annum (%)	No. of Non-beneficiary	Rate of interest per annum (%)
Govt. Banks	200 (100%)	7	-	
Private Banks	-		2 (2.08%)	39
SHG	-		2 (2.08%)	24
Friends	-		21 (21.88%)	47.4
Relatives	-		23 (23.96%)	46.32
Local Money lender	-		47 (48.96%)	50.16
Trader			1(1.04)	42
Average		7		47.4

Figures in parentheses indicate percentage to total

**Table 4: Factors influencing repayment of loan and borrowed amount**

Particulars	Beneficiary		Non-beneficiary	
	Coefficients	Standard error	Coefficients	Standard error
Intercept	11924.116	4195.299	161.3823	11481.053
Age	-321.792***	99.088	-222.898	255.249
Family Size	-349.518	339.285	-2678.27**	1206.23
Education	-83.555 why -ve?	114.817	1564.29*** why +ve?	358.29
Landholding	2918.216***	929.103	-7544	5323.80
Farming Experience	246.982**	98.564	233.345	248.89
Income	1.070***	.037	0.2376***	0.0584
R Square	82 %		35 %	
No of observations	100		96	

\*\*\* and \*\* denote significance at 1 %, 5 % level of significance respectively

**Table 5: Determinants for farmer's access to Kisan Credit Card (KCC)**

Variable	Co-efficient	SE	Odd ratio
Age	0.012	0.010	1.012
Family size	0.015	0.071	1.015
Education (years)	0.099***	0.027	1.104
Land holding	-0.161	0.124	0.851
Membership of SHG/Farmers' club	1.024***	0.240	2.784
Winter/Summer cultivation	0.717***	0.252	2.049
Livestock ownership	-0.297	0.248	0.743
Extension contact	0.848***	0.246	2.336
Constant	-3.234	0.748	0.039
Number of observations	400		
Prob>Chi2	0.000		
-2 Log likelihood	466.013		
Cox and Snell R-square	0.198		
Naglekerke's R-square	0.265		

Note: SE denotes Standard Error

\*\*\* denotes significance at 1 % levels



**Table 6: Problems faced by beneficiary group in repayment of borrowed money**

Particulars	Garrett score	Rank
High cost of cultivation	65.45	I
Low yield	64.43	II
No earning in off season	62.62	III
Crop failure due to natural calamities	60.79	IV
Increase household expenses	58.06	V
Diversion of fund to other non-farm venture	48.10	VI
Repayment of old debt	44.86	VII
Non remunerative market price of crop	43.75	VIII
Lack of good marketing system	41.71	IX
Not willing to repay	19.38	X

**Table 7: Problems faced by non-beneficiary group in repayment of borrowed money**

Particulars	Garrett score	Rank
Household expenses	71.32	I
No earning in off season	63.50	II
Crop failure due to natural calamities	61.84	III
Low yield	61.37	IV
High cost of production	59.17	V
Diversion of fund to other non-farm venture	49.13	VI
Lack of good marketing system	40.73	VII
Repayment of old debt	40.11	VIII
Non remunerative market price of crop	37.56	IX
Not willing to repay	19.96	X

stable flow of income thereby increasing the loan repayment rate. Household income also had a positive and significant effect on the repayment of loan. R square was 82 % implying that 82 % of the variation in loan repayment of KCC beneficiaries were explained by the variables taken in the model. In case of non-beneficiary, family size was negative and significant. As number of dependent persons in the family increased, family expenses increase, leading to poor loan repayment. Level of education and household income had a positive and significant effect on the repayment for the non-beneficiary group. Education has a direct bearing with repayment of borrowed amount as the non-beneficiaries have major occupation like fishery, poultry, piggery, petty business, etc. where education level help in earning better income. Anozie *et al.* (2014) reported that formal education enhanced capabilities to comprehend technological innovations in economic activities which lead to increased and sustainable agricultural production. The non-beneficiaries had lesser size of land holding and less number of households having crop cultivation as primary occupation which is a reason for the insignificant and negative sign of the coefficient of land holding. R square was 35 % implying that 35 % of the variation in repayment of borrowed amount was explained by the variables taken in the model.

### Land holding

Uguru and Cletus (2017) found that farm yield, household size, health condition of household member, amount of loan obtained and repayment conditions were the factors influencing cooperative loan repayment. Kuye and Edem (2019) reported that loan repayment was affected by off-farm income, interest rate and farm income. Wongnaa and Vitor (2013) show that education, experience, age and off-farm income had positive effects on loan repayment. Ume *et al* (2018) reported that household size, extension services, farming experience, educational level and off-farm income were the determinant factors for rice farmers' loan repayment ability.

### Determinants for farmers' access to Kisan Credit Card

The results of the binary logistic regression model for examining the factors affecting farmers' access to KCC is presented in Table 5. The explanatory variables included in the model are age, family size, education, land holding, membership of SHG/Farmers' club, winter and summer crop cultivation, livestock ownership and extension contact. Farmers access to KCC were given value P=1 while for others the value of P was assigned as zero. The P-value for the model fit statistics was less than 0.01 and highly significant at

$p < 0.001$  with eight degrees of freedom, indicating that at least one of the parameter in the model is non-zero. Cox and Snell R-square was 0.198 indicating that 19.8 % of the variations in probabilities of farmer's having access to KCC was explained by the covariates defined in the logistics model. Regression results revealed that education, extension contact, membership of SHG/ Farmers' Club and crop cultivation in winter and summer season were the significant determinants of farmer's access to KCC loan. All the co-efficient had positive sign revealing that these variables had a positive effect on the farmer's access to KCC loan. Higher level of education makes easier to understand the knowledge on KCC scheme and help in better access to KCC loan. Most of the KCC beneficiaries were either member of Self-help group or Farmers' Club where they get timely information for documentation and submission of KCC forms. Also, the chief coordinator of Farmers' Club and president of Self Help Group take a lead role in compiling the required documents for getting the KCC. Also, each Farmers' Club and SHG take group responsibility for repayment of loan in case if any members are not able to repay the loan due to unavoidable circumstances. These collective approach and responsibility sharing of village level informal group help the bank for readily issue of KCC loan. Farmer's growing crop in winter and summer season over and above the *kharif* rice cultivation have a higher chance for access to KCC loan because there is round the year employment generation and higher earning of income compared to those farmers with only *kharif* rice cultivation. Extension contacts of the farmers with KVK staff, subject experts, agri and allied department staff, extension personnel, *etc.* boost the moral and confidence of the farmers for adoption of new technology and farming practices which ultimately increase the farm income, thus making them more creditworthy. Hence, these factors play a significant role in farmer's access to KCC loan. Kumar *et al.* (2007) and Bista *et al.* (2012) also found that education had a positive and significant effect on household's decision to avail KCC loan.

The odd ratio of education revealed that one-unit increase in education level increased the odd of access to KCC loan by 10.4 %. The odd ratio of membership of self-help group and Farmers' Club revealed that one-unit increase in membership of self-help group and Farmer's Club increased the odd of access to KCC loan by 178 %. The odd ratio of winter and summer cultivation revealed that one-unit increase in winter and summer cultivation increased the odd of having access to KCC loan by 104 %. The odd ratio of extension contact revealed that one-unit increase in extension

contact increased the odd of getting access to KCC loan by 133 %.

#### **Constraints faced by farmers in repayment of borrowed amount**

The constraints faced by farmer's both beneficiary and non-beneficiary group were ranked based on their priority and ranks assigned by them were converted into mean scores using Garrett's Raking Technique and the results are presented in Table 6 and 7. Altogether, ten constraints faced by the farmers were listed for both the groups. The study found that high cost of cultivation was the main problem of the beneficiary group with mean score of 65.75. The other major problems in order of importance were low yield, no earning in off season, crop failure due to natural calamities and increase household expenses. Diversion of fund to non-farm activities and repayment of old debts were other problems which affect the timely repayment of KCC loan. Verma *et al.* (2019) reported crop failure due to natural calamities, lack of sufficient knowledge about the scheme, lack of knowledge about improved crop production technology, poor soil fertility and lack of irrigation facilities as major constraints in the operation and utility of KCC. Prakash and Kumar (2016) reported untimely disbursement of loan, inadequate loan amount and contribution to share capital of society as major constraints in adoption of KCC loan. Kuye and Edem (2019) reported that high interest rate, short loan repayment period, high taxation, high cost of production and poor supervision as major constraints for loan repayment. Uguru and Cletus (2017) in their study found that high interest rate, late disbursement, natural hazard, high illiteracy, diversion of fund to non-farm venture, family size and low yield as constraints pertaining to loan repayment among cooperative members.

In case of non-beneficiaries who borrowed money from informal source, the most important problem affecting repayment was increase in household expenses. Other problems in order of importance were no earning in off-season, crop failure due to natural calamities, low yield and high cost of production. Diversion of fund to other non-farm venture and lack of good marketing system are other factors affecting the repayment of borrowed money. It was observed from the study that institutional financial support to farmers in the form of KCC especially for the small holder farmers is a landmark step for getting out of the clutch of money lenders, which is dominating in the state. The availability of easy and cheap credit is a boon to the poor farmers, but at the same time institutional support and a strong monitoring mechanism is also required for ensuring effective use of the credit, so as to increase the crop production and productivity which in turn will increase

the loan repayment rate. In order to encash long term benefits of the KCC scheme, financial literacy and good banking practices need to be inculcated among the borrower. The participation of farmers in grassroot level informal groups like SHGs and Farmers Club have a profound effect for enrolment in KCC scheme as they get awareness of the scheme through participation in financial literacy programmes, fulfil the needful documents and timely submission of KCC form to banks through group approach. Also, the financial institutions consider SHG and Farmer's Club members as credit worthy as they have good banking credentials and saving habits. It is imperative that the farmers who are non-beneficiaries of KCC should participate in the SHGs and Farmer's Club so as to avail the KCC loan and get rid of the borrowing from informal money lenders which charge exorbitant rate of interest. For safeguarding the farmers from crop losses due to natural calamities, compulsory crop insurance for all KCC beneficiaries should be implemented and strong linkages with extension personals should be developed.

#### ACKNOWLEDGEMENT

Financial support provided by the ICAR Research Complex for North East Hill Region, Umiam, Meghalaya to carry out the study is gratefully acknowledged.

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