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Impact Of Small Farmers Credit Program On Farm Output Net Income And Adoption Of New Methods In Nepal

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INTRODUCTION

As in most less developed countries (LDCs) agriculture is by for the most important sector in the Nepalese economy in terms of gross domestic product, national employment, export earning and raw materials to the industries. Approximately 94 percent of the total population relies on agriculture for subsistance.

But, however, despite lots of hard efforts in the past to develop the agricultural sector the growth in agricultural productivity has not been satisfactory. The statistics for some recent year reveal a disturbing situation. Population appears to be growing at about the rate of 2.0 percent per year while food grain production is increasing only at a rate of about 1.2 percent annually which was for less than the 3 percent increase annually projected for the fourth five year plan (1970-1975) [1]. With the present 2.3 percent annual population growth rate and lower growth rate of food grain production, there will be a deficit of 93 thousand metric tons of food grain for home consumption in the year 1980 (Bista, 1976). Despite the slow growth rate in agriculture the disparity between big and small farmers also became wide (Rana, 1978).

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1. C.H. Antholt : Unpublished working paper, Agricultural Sector Assessement for Nepal 1974.

d) The adoption of new method is positively related to level of income and educational achievement of farmers.

e) Farmers' views toward institutional credit affect their borrowing behaviour.

3 THEORITICAL BACKGROUND

Although new technology constitute a major dynamic force for the modernization of peasant agriculture its adoption has been resisted by farmers and this has led to what is called *Technological Gap*. This technological gap is seen by the planners as a potential source of higher productivity (Wharton, 1971). The meagre preadoption capital of small farmer is regarded as the main constraint to the adoption of new agricultural methods by small farmers. The availability of cheap institutional credit along with modern inputs is considered to be an important instrument to over come this constraint (IBRD, World Bank, 1975; FAO, 1966; Schluter and Mellor, 1972; Singh, 1971; Abott, 1976; Schultz, 1964).

However, some studies in LDCs show that the availability of institutional credit along with modern input does not necessarily induce small farmers to adopt new agricultural methods to change output and income. (There is a great deal of empirical studies in this regard. For example, Hendrix, 1971; Lowdermilk, 1972; Rochin, 1971; Elliot **et al** 1976). The relationship between the availability of institutional credit and the adoption of new methods, farm outputs and income is not clear cut. Social and personality variables such as attitude toward risk appear important factor influencing small farmers decision to adopt new methods (There are many who support this argument such as Panney, 1968; Rogers, 1969 and 1970; Nair, 1961; Wharton, 1971).

It appears that the behaviour of small farmer with respect to the adoption of new agricultural methods is a complex matter involving not only the economic factors, but social and personality attributes as well. The decision to adopt or not to adopt the new agricultural methods is probably a result of the interaction of all these variables.

4: METHODOLOGY AND DATA

4.1 Methodological Framework of this Analysis

Perhaps the most convenient and direct way of examining the impact of agricultural credit programme on the performances of small farmers is to compare the loan borrower farmers with similar farmers who have not borrowed. Thus, a simple experiment measuring the

Though a number of reasons are cited for the slower growth rate in agriculture and desparity between big and small farmers, the main reason cited currently is that the small farmers who constitute the bulk of rural society could not participate in the development process (Rana, 1976).

At present the main concern of the planners and policy makers is to bring the small farmers (who constitute about 80 percent of rural population) into the core of all agricultural development efforts. This envolvement of small farmers in the development process gained momentum with the launching of small farm credit programme (SFCP). The first two such programme were launched in the 1975, one in hills (Nuwakot district) and the other in the terai (plain)– Dhanusa district. At present the number of SFCP is 30 and by the end of next five year the number would reach 210.

The importance of the evaluation of the performance of SFCPS is obvious for the policy guidelines for the SFCPs that to be launched in future. The present study attempted to evaluate the impact of TFCP (in Nuwakot) on farm output, net income and the adoption of new methods.

2. OBJECTIVES OF THE STUDY:

The objective of the study were:

a) To assess the impact of institutional credit availability on:

I) farm output and net income,

II) the adoption of new agricultural methods,

b) To analyse small farmers' personality variables and examine their relationship with the adoption of new methods and borrowing; and on the basis of the findings to suggest policy alternatives.

In meeting the above objectives it was intended to test the following hypothesises:

a) The availability of agricultural credit to Nepalese small farmers is associated with increase in farm out put and net income.

b) Farmers who use the available credit facilities are more likely than those who do not adopt new agricultural methods.

c) The adoption or non–adoption of new methods can be related to farmers' attitude to fatalism, to change, and to risk.

effect of institutional loans on small farmers' farm output, net income and the adoption of new agricultural method was undertaken by examining the performance of two randomized groups, one with loans and the other without, from the same universe. Additionally comparisons were made of the situations of the loan borrowers at two different points in time, one before borrowing and the other after borrowing. This latter comparison would enable the before brrowing preformance to act as a check.

The selection of one village panchayat as the study area ensures a high degree of similarity between farmers with regard to environmental conditions thus minimizing the difference in the various performance variables due to such conditions.

4.2 Sources of Data

The data for this study were obtained from small farmers credit programme in Nuwakot district central hills, Nepal. It is one of the two first pilot programmes launched in 1975. In the district, the pragramme covers only two village panchayats. The two panchayats are Tupche and Karkimanakamana. For the purpose of the study Tupche was selected because of the homogenity of its topography and climate.

Questionnaire were designed to collect relevant data relating to the agricultural production process, small farmers' attitudes and other personal characteristics of both the loan borrower and non-borrower farmers.

A complete enumeration was made all the small farmers (104 borrowers and 266 non-borrowers, making a total of 370 farmers) of the five wards of the study area along with the farm size of 40 for each of the borrower and non-borrower group was determined. Each group was then stratified into two sub-groups on the basis of farm size. The two sub-groups were:

a) Those with farm size under four ropani, and

b) Those with farm size four to eight ropani. [2]

These size groups were represented in the sample in the same proportions within both the barrower and the non-borrower groups as they appeared in the total population.

After determining the sample size a table of random numbers was used to draw the sample. A list of farmers to be interviewed was then prepared for both the groups.

The 80 sample farmers were interviewed during February to March 1978. Information relating to crop production was gathered for March 1974 to February 1975 period wet

2. One ropani calculated equivalent to 0.05 hectare.

and dry season crops and November 1976 to October 1977 period dry and wet season crops. All the other information collected related to the survey period. (For general characteristics of the farmers see appendix 1 Table 1)

Analytical Technique Used in this Study

The segments of the analysis and the types of analytical techniques used are summarized as follows:

Analytical Segments Description	Analytical Techniques Used
a) Comparison of farm output, net income, resource productivity and the adoption of new methods.	Farm level accounts, productivity ratios, cross tabular comparison, statistical hypothesis testing.
b) Examination of small farmers' attitudes toward new methods, credit, risk, to change, etc., Analysis of selected personality variables and their relationship to the adoption of new methods.	Percentage, cross tabular analysis, chi-square, fisher exact probability and Kolmogorous-mirnov analysis.

5. MAJOR EMPIRICAL FINDINGS

5.1 Impact of Institutional/Credit on Farm Output and Net Income

a) Impact on farm output:

The detail assessment of impact of the SFCP on farm output showed that the programme had a positive impact on farm output indicating that the availability of institutional credit was positvely related to overall output.The borrower groups output per farm and per ropani of net cultivated area was significantly higher than output in the pre-borrowing situation and output of the non-borrower group, regardless of farm size (see Appendix 2 (a) Table 1). The primary factors expected to be responsible for the increased farm output of borrower group were examined. The analysis showed that among the primary factors, crop mix, cropped area and crop yield productivity, only the cropped area factor was important in making a statistically significant contribution to the overall output performance of borrowers.

The reason for significantly higher cropped area was that the borrower group was able to double crop (and even triple crop in some cases) more frequently than they could in

their pre-borrowing situation and could the non-borrower counter part group. Their (borrowers) cropping intensity in both low land and up land was substantially higher than their own pre-borrowing situation and the non-borrower group (see Appendix 2 (a) Table 2 and 3).

This frequent double or triple cropping might have been possible due to the availability of credit. However, the availability of institutional credit had no impact on crop mix and crop yield productivity. In absolute terms, the yield produced by the borrowers was substantially below the potential yield indicating wide scope for increasing the crop yield (see Appendix 2 (a) Table 4).

b) Impact on net farm income:

The analysis of the impact of the availability of credit on farm net income suggests that credit was positively related to overall total farm net income per farm and per ropani of net area of the borrowers wer significantly higher than that of the non-borrowers. However, small farmers ability to produce profit per unit of gross cropped area did not appear to be associated with the availability of institutional credit regardless of farm size, since the net farm income per ropani of gross cropped area was not statistically significant between the two groups (see Appendix 2 (a) Tables 5). The probable reason for the significantly greater overal net farm income of the borrower farmers over the non-borrowers was possibly due to their significantly higher cropped area due to multiple cropping (refer to above section 4.1).

The conclusion that can be drawn from the analysis is that the borrowers were able to obtain greater total net farm income (than non-borrowers) by utilizing their total land base more intensively by taking multiple crops. However, their efficiency in producing profit per unit cropped area was not better than the non-borrowers. This indicates that the borrowers were no better in the efficient use of inputs per unit of cropped area than non-borrowers.

5.2. Institutional credit, Farmers' Personality Factors and Their Relationship to Borrowin Behaviour and the Adoption of New Methods

a) Credit and Adoption of New Methods

The analysis revealed that the availability of credit was not associated with the adoption of new high yielding varieties (NHYV) in the sense that borrowers' performance in the adoption of NHYV was essentially similar to that of their own performance in before borrowing

situation and that of the non-borrowers. Regardless of whether they were borrowers or non-borrowers, all farmers devoted all or most of their land to traditional varieties rather than to NHYV (see Appendix 2 (b) Table 1 and 2.

The analysis also showed that the availability of institutional credit was not associated with the use of chemical fertilizers. The dtfference in the amount of fertilizers used per ropani of cropped area between borrowers and non-borrowers was not statistically significant. In addition, the amout of fertilizers used was small in the absolute terms (see Appendix 2 (b) Table 3). There appeared to be under investment in crop droduction despite the availability of subsidized institutional credit.

5.3 Small Farmers' Personality Variable, Borrowing Behaviour and the Adoption of New Methods:

a) Attitude toward change and new methods:

On the basis of the theoritical insight it may be assumed that fatalism is an attitude which might be expected to inhibit the adoption of new methods.

Majority of the small farmers of the area were fatalistic.

77 percent of responents disagreed with the statement, "It is not fate that really matters, but to improve one's situation is in one's own hand".

The analysis indicated that fatalism wae not associated with education and income level. As a matter of fact the poorest farmers fn the sample were not significantly more fatalistic than their wealtheir counterparts.

The greater interest in the present study is the effect of fatalism/non-fatalism upon the adoption of new methods. The analysis showed that the fatalistic farmers were not significantly less likely to adopt new methods indicating that fatalism is not ossociated with the adoption of new methods. 56.25 percent of non fatalistic farmers adopted NHYV while 37.03 percent of fatalistics farmers also adopted NHYV. (The fisher exact probability analysis was not significant at 5 percent level for relationships). Similar was the result in case of use of chemicals by non-fatalistic and fatalistic farmers.

The findings thus contradicts that the postulation that fatalistic farmers would be less willing than non-fatalistic farmers to adopt new methods.

. The data showed that 48 percent of the sample farmers view new methods favourably. The remaining 52 percent hold negative attitudes toward the new methods. Positive/negative attitudes towards new methods were not found to be associated with income or educational level

The analysis of data revealed that small farmers' adoption of NHYV, use of fertilizers and chemicals was not related to their over all attitude toward new methods. The farmers who hold positive attitude toward new methods 47.05 and 32.75 percent of them adopt NHYV and chemicals respectively. The figures in case of the farmer who hold negative attitude is 36.11 and 16.66 percent respectively. These relationships were not significant at 5 percent level. The finding thus seems to be in opposition to the general contention that attitudnal variables with respect to new methods may affect the adoption of these methods.

b) **Attitude toward risk:**

It was found that majority (63.0%) of Tupche small farmers were risk averters. Risk aversion was an important factor influencing small farmers' decision to try new methods. Risk averters were reluctant to try new methods and were less likely to adopt them. Only 26.66 percent of risk averters farmers adopted NHYV while in case of farmers who were risk neutral 80.75 percent of than adopted NHYV. (Fisher exact probability annalysis indicated that these relationships were significant at less than 0.005 level). With respect to use of chemical, 57.80 percent of risk–neutral farmers make use of chemical while in the case of risk averter farmers only 4.54. These relationships were also significant at less than 0.005 level of significance.

Attitude towards risk was associated with income level. The analysis revealed that as the small farmers' level of income decreased he had a greater tendency to be cautious in using locally untried new methods, and he was less innovative (see Appendix 2 (b) Table 4).

A further findings was that the majority of small farmers (61%) preferred smaller but more certain income to bigger uncertain income. This suggested that small farmers of the area were more concerned with risk of not serviving by not meeting subsistence needs (see Appendix 2 (b) Table 5).

These farmers were significantly less innovative than the ones who preferred bigger but uncertain income

c) **Small Farmers' interpersonal trust:**

Much has been made recently of the unwillingness of farmers in less developed

countries, especially peasant farmers to trust outsiders (Rogers, 1969).

It is expected that the farmers who distrust outsiders(i.e. people foreign to villagers) would frequently rely of local people as a source of information about new things than would the farmers who trust out siders.

The analysis on this aspect showed that only 30 percent of Tupche small farmers trust outsiders while 70% distrust outsiders as sources of information about new methods. The analysis also indicated that the data supported the hypothesis that the non-trusting farmers more frequently concentrate on villagers as a source of information about new methods. 61.90 percent of the farmers who trusted outsiders got information about new methods from programme officials, extension agents and businessmen while 27.14 percent of the farmers who distrusted outsiders relied on these sources for information about new methods, and the majority of them relied on the villagers. These relationships were significant at less than 0.01 level.

d) **Small farmer's educational level and adoption of new methods:**

It may be expected that a farmers' educational level would be an important factor influencing his decision to adopt new methods.

The analysis revealed that the adoption of NHYV was significantly associated with educational level, but the use of chemicals (insecticides and pesticides) was not related to educational level.

Further analysis indicated that a higher educational level seemed to be related to knowing about chemicals and how to improve yields in general (see Appendix 2 (b) Table 6 and 7).

There was a significant association between educational levels and income levels.

e) **Attitude of small farmers toward institutional credit:**

The analysis showed that 57% of the sample farmers had a negative attitude toward institutional credit, hence this result did not provide support for what seems to be an important assumption of the credit programme.

The analysis also indicated that farmers' attitude toward credit was independent of their income level, but was related to educational level.

One may expect the borrower to hold favourable attitude toward institutional credit. However, surprisingly enough, it was found that the borrower farmers were not significantly more favourable toward institutional credit than the non-borrowers.

Small farmers' attitude toward institutional credit affected their borrowing behaviour. The analysis of the sums borrowed showed that the actual amount of loan borrowed was substantially lower than the amount that would be needed in ord r to implement recommended farm practices (see Appendix 2 (b) Table 8). The analysis of reasons for not borrowing by the non-borrowers and for not borrowing more on the part of the borrowers indicated that a majority of the small farmers of the area view institutional credit as risky. They were reluctant to borrow more, because of their perceived fear (risk) of getting into debt or loss of assets on account of credit. Risk involved in institutional credit thus appeared to be an important factor inhibiting borrowing behaviour (see Appendix 2 (b) Table 9. 10, and 11).

In most cases, members of the borrowers group could borrow a larger amount of loan and so conduct more efficient farming operation and resource utilization, but decline to do so due to their attitudes and values. Concerning risk, it was an important consideration to those who borrowed as well as to those who did not.

Risk as a deterrent to credit usage appeared to be associated with small incomes. Relatively wealtheir small farmers tend to give non-risk related reasons for either not borrowing or for not borrowing more (see Appendix 2 (b) Tables 12 and 13).

A considerable portion of small farmers did not borrow or did not borrow more because they lack knowledge about lending procedures and the amount required by them or were not familiar with the officials.

f) **Conclusions and Recommendations Conclusions:**

Based on the findings of the study the following conclusions can be drawn.

a) Most of the Tupche small farmers were very poor considering the fact that nearly 81 % of the population had annual income of less than Rs. 500 per capita.

b) The availability of institutional credit was positively related to farm output and net income.

c) Among the primary factors responsible for increase output and net income the cropped area factor which was due to increased cropping intensity made significant contribution to increased output and net income. The borrowers achieved cropping intensities of about 191 percent on average while non-borrowers' was 157%.

Crop mix and yield productivity factors did not make any significant contribution to increased output and net income. Wide scope for increasing crop yield apparently exists, for the yield achieved at present is far below the potential yield.

d) The availability of institutional credit was not related to the adoption of new methods by the small farmers of Tupche. The finding thus negates the general contention that the provision of subsidized institutional credit is positively related to the adoption of new methods by small farmers.

Despite the availability of institutional credit the majority of Tupche small farmers devoted most of their land to tarditional crops. The proportion of land devoted to new high yielding varieties was small there was under-investment in modern inputs.

e) A majority of Tupche small farmers were fatalistic and held negative attitudes toward new methods. Fatalism and attitudes toward new methods, were not found related to the adoption of new methods.

f) A majority of Tupche small farmers were risk averters. Risk aversion was an important factor influencing small farmers' decisions to try new methods; risk averters were reluctant to try new methods and were less likely to adopt them; they preferred smaller but more certain incomes to larger but riskier incomes.

g) Farmers' income and educational levels were related to the adoption of new methods and knowledge about them. Wealthier or more educated small farmers more frequently adopted new methods and had more knowledge about them (new methods).

h) A majority (70%) of Tupche small farmers distrusted outsiders (people who were foreign to the village). Farmers' interpersonal trust was associated with the sources of information used by them about new methods.

Sources of information about new methods were associated to the adoption of new methods. Small farmers using direct sources of information about new methods more frequently adopted new methods and were more knwoledgeable about them than those farmers who used indirect sources of information about new methods.

i) More than 30 percent of the small farmers, regardless of whether they were borrowers, or non-borrowers held negative attitudes toward institutional credit. Attitudes toward credit was related to educational level, but not to income level of farmers.

Small farmers' attitudes toward institutional credit affected their borrowing behaviour. "Risk" perceived in institutional credit and in crop production was the underlying factor inhibiting small farmers from borrowing or borrowing larger agricultural production loans. Risk was an important factor to those who borrowed as well as who did not borrow. Lack of knowledge about the lending procedure appeared another factor affecting small farmers' borrowing.

To sum up, the availability of institutional credit increases small farm output and net income through crop intensification. However, the availability of cheap credit does not seem to be a sufficient condition for the adoption of new agricultural methods by small farmers.

The evidence is the small farmers' income level, educational level, sources of information used and attitudes toward institutional credit are factors which determine the adoption of new methods and the use of institutional credit by them, at least in the context of small farmers of Tupche, Nepal.

Policy Recommendations

Availability of institutional credit was important in helping small farmers to increase their producitivity through cropped area expansion. Therefore, continued availability of institutional credit should help sustain the intensity of cropping achieved by the borroweres and should enable potential borrowers to increase cropping intensity in future provided they are encouraged to borrow.

However, the limited total land base of small farmers and crop life cycles iimits the role of cropped area in increasing farm output. The small farmers have small farm sizes in absolute terms and most of the crops (except some crops such as vegetables and mustard) have life cycle of about five months' duration. This would permit only two crops a year (that is, cropping intensity of only 200%). So with the current cereal crop-oriented crop mix there is not much potential to increase cropping intensity beyond 200 percent, unless the crop mix itself is changed to include some short duration crops such as vegetables. Consequently, the implication in that policy measures should also focus on other output increasing factors (crop mix and crop yield) while sustaining and encouraging the achievement of maximum cropping intensity at the same time.

Change in the current cereal-oriented crop mix to a cereal-cash oriented crop mix would increse small farm output and net income susbtantially. Calkins (1976), in his study of impact of horticultural development on income, employment and nutrition in the District, found that cash crops (such as vegetables and fruits) have higher levels of output per unit of land and other resources devoted to their production. A change from cereals to crops such as vegetables and ground nuts would susbtantially increase small farm income. Devotion of some proportion of land to such cash crops would thus be beneficial to the small farmers of the area.

However, the cash crops are more sensitive to market and marketing factors. Calkins (1976) found the lack of marketing and transportation facilities to be important barriers to the production of cash crops. In addition, such crops are exotic ones and the relevant practices would be an important factor retording the adoption of such crops by the small farmers. Therefore, arrangement of proper marketing facilities and the diffusion of ideas about the cultural practices of cash crops would have to be considered in order to induce farmers to consider a cereal-cash oriented crop mix.

There were indications that small farm output and net income could be increased further by increasing crop yield. Helping the farmers to overcome the present under-investment and inefficiency in crop production and encouraging them to adopt the new high yielding varieties of crops would greatly increase the crop yield and thus farm productivity.

The foregoing discussion of the primary factors responsible for increasing farm output and net income and the findings in relation to the adoption of new methods by the small farmers all imply that, besides the availability of cheap institutional credit, some other important policy measures have to be considered in the small farm credit programme in order to induce changes in the directions that are felt to be desirable. The additional relevant policy measures would relate to the removal of factors that inhibit small farmers in altering the grain-subsistence oriented crop mix, the use of credit and the adoption of new methods.

The observation that small farmers who make use of direct sources of information about new methods are more likely to adopt new methods, implies that direct sources of information about new methods must be in contrary with small farmers. The majority of the small farmers of the area (70% of the population) do not trust outsiders as sources of information about new methods. A majority of the small farmers rely on other villagers as a source of information about these methods. The policy implication for this sort of problem would be to train a few selected local personnel them-selves for the extension work.

Training of local personnel to replace the conventional government extension workers could prove an effective extension service to the community. Being a local person, communication problems due to problems of dialect and the like, should be less and high level of contact with farmers should be possible.

Such local agents would provide on their farms early field trials with new methods and could this set an example to their fellow villagers. Demonstration plots on their farm would be an additional means of assisting the farmers to develop realistic expectations about new methods and thus reduce the Risk they perceive to be associated with new methods.

Such local trained personnel would also assist farmers to understand borrowing procedures and could also assist programme officials in loan collection (from farmers) and in other related ways.

In addition, such an approach would also lighten the pressure on the scarce governmental personnel. The local person trained for the purpose would also benefit, for he would be earning something from the government as well as being able to carry on farming with his family.

Having observed the role of risk aversion in small farmers' considerations of the decision to adopt new methods and to borrow institutional credit, the elimination of Risk from their mind seems an another obvious policy object which would help small farmers.

The elimination of the risk element completely from the minds of the small farmers undoubtedly will involve the provision of some mechanism for insuring the farmers against undue losses, perhaps specifically as a consequence of trying the new methods. Insurance schemes which would gurantee a certain minimum income in association with approved new methods would eliminate the possibility of disaster and make these methods more attractive to small farmers who cannot afford a crop failure. Such a mechanism wouid allow farmers to shift the risks to the insurance system and they would be protected against the element of risk in crop production. Such a scheme would stabilize small farmers' incomes and induce them to adopt new methods.

Such an insuranee scheme, integrated with the credit programme would also reduce small farmers' fears of borrowing to finance new methods by assuring his ablity to repay his loan. As their investment in crop production is protected, such an approach would thus encoerage small farmers to invest to crop production adequately and help them to achieve greater efficiency in reasource use.

However, for such a scheme to be successful, the new methods must be basically profitable and if they are, the farmers must, in addition, be convinced that the new methods are indeed profitable. Here again the role of local personnel trained for extension purposes is in evidence. Insurance schems accompained by an effective extension service would greatly increase the security of small farmers and would encourage them to adopt new methods.

The use of land as collateral and the risk inherent in crop production are probably important factors contributing to small farmers' fearfulness in borrowing institutional loans. Alternative approaches of securing loans for refinancing and flexibility in loan repayment or insuring loans which undoubtedly serve to eliminate much of the risk perceived by small farmers.

Arrangement of proper marketing facilities for agricultural commodities, especially for those which are perishable in nature would also serve to eliminate risks from the minds of small farmers. The local cooperative society could help the small farmers in marketing their agricultural products.

Education (even of a limited nature) of farmers appears to be an important factor to be considered in the small farmers' development programme because it enbances their basic skills and concepts in relation to new methods and understanding of governmental services (for exsample, credit programmes). This suggests that a free educational programme (for about 3-6 years) for the children of small farmers who could not afford to educate their children might be justified. Such a programme would probably have positive impact on incresing agricultural productivity in the long run.

In addition, an adult education or training programme in the community would have substantial impact on agricultural productivity in the short run. Obviously, such programmes would involve some cost and would impose demands on the scarce educated manpower in the country. However, the benefit from such programmes would undoubtedly be quite high, both directly and indirectly.

The shortage of educated personnel for the about purpose could be alleviated to some extent if the governmental officials working in the field could devote a few hours a day for this purpose of adult education. They could, for exemple, run night classes for adult. The students of National Development Service (NDS) could also be encouraged to participate in such adult educatlon campaigns in addition of their stated task of teaching in the local schools.

Some of the policy measures suggested in this study, for example, training lacal people as extension agents, insurance scheme, would be new the country, but they must be introduced if the objectives of raising small farmers' productivity is to be achieved.

APPENDIX – 1

Table 1: General Characteristics of Sample Farmers

Characteristic	Mean	
	Borrower	Non-borrower
Education of farmers (years)	3.95^{NS}	3.13
Family size (no. of member)	6.01$^{\odot}$	5.12
Number of activa family membar (12–69 years of age)	2.94^{NS}	2.72
Age of farmers (Years)	44.62$^{\odot}$	38.54
Farm Size (Ropani) Irrigated area	2.59^{NS}	2.46
Unirrigated area	2.88^{NS}	2.91

NS = The differences are not significant

$\odot$ = The differences are significant at 0.005 level of significant

APPENDIX – 2

Table 1: Comparision of Mean out-put Between Sample Farmers

Farm size and type	Mean Output per Farm	Mean Output per ropani of cultivated area (Rupees)
0–5 Ropani Borrower	1325 **	380 °°
Non–Borrowers	1030	287
5–10 Ropani Borrowers	2667°°	355°°
Non–Borrowers	1472	275
Overall sample Borrowers	2025**	367°°
Non-borrowers	1515	281
0–5 Ropani Borrowers	1325°°	380°°
Before borrrwing	953	283
5–10 Ropani Borrowers	2667**	355°°
Befor borrowing	2041	273
Over Sample Borrowers	2025**	367°°
Befor borrowing	1521	278

°° The differences are significant at .005 level

** The differences are significant at .05 level

APPENDIX - 2 (a)

Table 2: Comparision of cropped of Area Between Sample Farmers

Farm size and type	Mean cropped area in low land (Ropani)	Mean cropped area in up land (Ropani)
0-5 Ropani		
Borrowers	3.72***	3.61^{NS}
Non-borrowers	2.21	3.49
5-10 Ropani		
Borrowers	6.25**	7.71**
Non-borrowers	4.79	6.13
Overall sample		
Borrowers	5.02**	5.99**
Non-borrowers	3.85	4.82
0-5 Ropani		
Borrowing	3.72**	3.61^{NS}
Before borrowing	2.66	2.34
5-10 Ropani		
Borrowers	6.24**	7.71**
Before borrowing	4.33	6.25
Overall sample		
Borrowers	4.98**	5.99**
Before borrowing	3.49	4.36

NS The differences are not significant

*** The differences are significant at .005 level

** The differences are significant at .05 level

Table 3: Comparison of the Index of Average Cropping Intensity Between the Sample Farmers 1

Farm size and type	Cropping intensity in low land	Cropping intensity in upland
0-5 Ropani		
Borrowers	194	193
Non-borrowers	157	168
5-10 Ropani		
Borrowers	182	192
Non-borrowers	148	158
Overrall Sample		
Borrowers	189	193
Non-borrowers	153	162
5-10 Ropani		
Borrowers	182	192
Non-berrowers	156	160
Overrall Sample		
Borrowers	189	193
Non-borrowers	152	160

1/ Index of cropping Intensity defind as cropped area x 100 cultivated area (Farm size)

Table 4: Comparison of the Actual Yield Receiven by the borrowers and the Potential Yield Under Improved Practices by Crop

Type of Yield	Crops			
	Rice	Maize	Millet	Wheat
Actual yield received by borrowers (Kg/ropani)1	157	100	92	89
Potential Yield (Kg/ropani)2	225	175	n.a.	150
Borrowers yield as percentage of the potential yeild	69	57	-	59

1. Yield here refers to the yield received by the overall sample.

2. This yield refers to that yield which would be achieved under improved methods and recommended practices.

SOURCE: Agricultural Diary (1975) Agricultural Information Section, Department and Agriculture HMC, Nepal.

n.a. Figure not available

Table 5: Comparison of Net Farm Income Between the Sample Farmers 1

Farm size and type	Mean net income per farm (Rs)	Mean net income per ropani of cultivated area (Rs)	Mean net income per ropani of cropped area (Rs)
0-5 Ropani			
Borrowers	1090^{NS}	310**	159^{NS}
Non-borrowers	947	255	171
5-10 Ropani			
Borrowers	2120**	280**	147
Non-borrowers	1676	233	149
Overrall sample			
Borrowers	1620**	296***	154
Non-borrowers	1306	245	159

NS The differences are significant

*** The differences are significant at .005 level

** The differences are significant at .05 level

1. Borrower farmers' before borrowing situation could no be analysed because were unable to give information regarding the input cost in the pre-borrowing situation.

APPENDIX - 2(b)

Table 1: Comparison of Cropped Area Devoted to NHYV by sample Farmers[1]

Farm type	Mean area under NHYV Rice (Ropani)	Mean area under NHYV Maize (Ropani)	Mean area under NHYV Wheat (Ropani)
Borrowers	2.80^{NS}	2.92^{NS}	1.74^{NS}
Non-borrowers	2.02	1.97	1.30
Borrowers	2.80^{NS}	2.92^{NS}	1.74^{NS}
Non-borrowing	1.92	2.03	1.08

NS The differences are not significant

1. Comparision is on an overallsample basis.

Table 2: Area under NHYV and Local Varieties Devoted by the sample Farmers as a Percentage of Total Cropped Area by Crops

Farm Type	Rice		Maize		Wheat		M llet	
	Area under NHYV	Area under NHYV	Area under NHYV	Area under NHYV	Area under NHYV	Area under NHYV	Area under NHYV	Area under NHYV
Borrowers	28.25	71.75	20.35	79.65	64.13	35.97	–	100
Non-borrowers	20.16	70.84	14.38	85.62	32.72	67.28	–	100
Before borrowing	17.91	82.09	14.23	85.77	39.42	60.58	–	100

Table 3: Comparison of the Mean Amount of Fertilizers Per Ropani Used by the Sample Farmers With that of the Recommended Dose by Crops. (Amt. in Rs.)

Particulars	Rice		Maize		Wheat		Millet	
	Local	Improved	Local	Improved	Local	Improved	Local	Improved
Borrowers Amount	9	29	11	21	8	–	–	30
Recommended Dose	14	46	25	42	13	–	–	40
Borrowers' amount as percentage of recommended dose	64	63	44	50	58	–	–	75

SOURCE: Leaflets on packages of practices for NHYV, Agricultural Information Section, Department of Agriculture, HMG, Nepal.

Table 4: Small Farmers' Attitudes Towards Trying New Methods by Income Level

Per capita Household income[1] (Rs.)	"When new agricultural methods come to the village it is better to wait and see what happens when they are used by others"	
	Agree	Disagree
Below 300	30	6
301 - 500	12	9
501 - 700	2	11

The Kolmogorov-Smirnov analysis indicated a significant relationship at 0.05 level of significant for these relationships

1 Income variable in the study was put as per capita household income which is a family "wel-being" form of the income variable. It is assumed that in this form it will tend to reflect the farmers' attitude toward 'risk' invloved in new methods.

Table 5: Attitudes of Small Farmers Toward Risk by Income Level

Per capita household income (Rs)	"It is better to take a chance on making a big profit than to be content with a smaller but more sure profit"	
	Agree	Disagree
Below 300	5	31
301 - 500	11	10
501 - 700	11	2

The Kolmogorov-Smirnov analysis indicated a significant relationship at less than .05 level,

Table 6: Adoption of NHYV of Crops by Small Farmers by Educational Level

Educational level (years)	Adoptors	Non-adoptors
None	10	28
1-3	12	6
2-6	7	7

The Kolmogorov-Smirnov analysis showed a significant relationship at the0.05 level of significant

Table 7: Number of Small Farmers Knowing about How to Improve Crop Yields by Educational Level

Educational level (years)	Know about improved yields	Do not know about improved yields
None	8	30
1-3	9	9
3-6	9	5

The Kolmogorov-Smirnov analysis indicated a significant relationship at the level

Table 8: Comparison of Amount of Credit Borrowed and Amount Needed per Farm According to Recommendation

Group type	Mean amount borrowed (Rs)	Mean amount needed (Rs)	Amount borrowed as % amount needed
0–5 Ropani	109	188	57.97
5–10 Ropani	270	391	69.05
Entire sample	192	295	65.00

Table 9: Reasons Given For Not Borrowing Loan

Reason Given	% of Farmers giving reasons
1. Afraid to borrow	25.71
2. If I cannot pay back the loan the Government might take away my land	17.14
3. Do not know how to get loan	14.28
4. If crops fail I will always be in debt	14.28
5. We do not get all the loan in cash	8.57
6. If something bad occurs I will have to borrow from money lenders to repay the loan	8.57
7. Do not know the officers	8.57
8. Do not like to borrow	2.88

Table 10: Reasons Given For Not Borrowing More by Small Farmers of the Area

Reasons Given	% of farmers giving reasons
1. Afraid of a big loan	28.57
2. Do not know the exact amount I need	20.00
3. Do not need more	17.14
4. If famine occurs it is more difficult to repay big loans	11.43
5. I thought the amount was sufficient	8.57
6. The more I take the more worries I will have	8.57
7. It is not free, one must repay it too	5.72

Table 11: Classification of the Reasons Given For Not Borrowing More

Main reasons (implicit)	Explicit reasons cited by farmers	% of farmers not borrowing more (because of the reasons listed in column)
Big loan risky	a. afraid of big loan b. the more one borrows the more worris one will have c. It is not free, one must repay it too d. if famine occurs, it is more difficult to repay big loans	54.29
Lack of knowledge of the actual amount required	a. it was thought that the amount borrowed was sufficient b. donot know the exact amount	28.57
Could manage with the amount borrowed	a. donot need to borrow more	17.14

Table 12: Reasons Given by Non-borrowers For Not Borrowing by Income Level

Per capita income (Rs)	Risk 1	Other reasons 2
below 300	17	3
301 – 500	5	3
501 – 700	1	4

The Kolmogorov-Smirnov analysis revealed that the relationship are significant at 0.05 level of significance.

1. Risk represents the response numbers 1, 2, 4, 6 of Table 9.
2. Other reasons involve response number 3, 4, 7 and 8 of Table 9.

Table 13: Reasons Given by Borrowers for not Borrowing More by Income Level

Per capita income (Rs)	Big loan risky	Donot know requirement and do not need more
Below 300	13	3
301 – 500	4	7
501 – 700	2	6

These relationships are significant at .05 level of significant using Kolmogrov-Smirnov analysis.

APPENDIX – 3 (a)

Notes on statistical procedures used in the study:

For the comparison of the performance of the borrowers with their performances in the pre-borrowing situation and with that of the non-borrowers counter parts in terms farm output, net income, the statistical procedure used was regression analysis. The type of regression equation run was:

Total farm output/output per ropani of cultivated or cropped area

$$= B_O + B_1 D_A + U_t$$

Where, D = 1 for non-borrowers

D = O for borrowers

U = disturbance term

B = mean farm output or output per ropani of cultivated or cropped area of the borrowers while ($B_O - B_1$) represents mean farm output of non-borrowers

A test was made to determine whether B_1 was significantly different fron zero. If the B_1 value was significantly diffirent from zero it was concluded that the difference between the mean farm output of borrowers and non-borrowers was significance.

This procedure was also followed in comparing net farm income between the borrowers and non-borrowers in terms of total net farm income, net farm income per ropani of cultivated or cropped area.

The presence of heteroscedasticity (if the case many be) was corrected by tansforming the regression relationship to the form:

$$\frac{\text{Total farm output}}{\sqrt{\text{Farm size}}} = \frac{B_O}{\sqrt{\text{Farm size}}} + \frac{B_1 D_t + U_t}{\sqrt{\text{Farm size}}}$$

The underlying rationale for this sort of transpoformation is that the variance of farm output was a function of farm size.

In case of the non-parametric statistical procedures used in the study, the detail can be found in any statistical book for behavirourl science.

APPENDIX - 3 (b)

Notes on the terms used and productivity measures:

1. Farm output

This is the value of output on a given farm which is the sum of the value of each crop produced. The individual crop value in turn are the product of three factors: the area of the crop cultivated, the yeild per ropani and the price received per kilogram (Kg) of the product. Thus, if we consider the typical borrower farm:

a_{iB} = The area (ropani cultivated) of crop i on farm B.

Y_{iB} = The yeild (Kg/ropani) of crop i on farm B.

P_{iB} = The price (Rs/Kg) of crop i on farm B.

Then,

$$V_{iB} = a_{iB} \quad Y_{iB} \quad P_{iB}$$

Where V_{iB} is the value of the i^{th} crop on the B^{th} farm. If we then add up the V_{iB}s for all the crops grown on that farm, we will have the total value of production on the farm. Using summation notation, we can say,

$$\text{Total value of production on farm B} = \sum_{i=1}^{q} a_{iB} \quad Y_{iB} \quad P_{iB}$$

Where q is the number of crops grown on farm B. If farm B is a borrower farm then we may define a corresponding non-borrower farm as farm NB. The total value of output for the non-borrower farm would be calculated in similar way as in the case of the borrower.

2. Land Productivity

There can be two measures of land productivity according to two definitions of the amount of land used, that is, output per unit of cropped area and output per unit of cultivated land. In the study output per unit of cultivated land is defined as "Land productivity' 'and output per unit of cropped area as output per ropani (crop yield).

Land productivity is measured as follows:

$$P_L = \frac{\sum_i \sum_i qij}{\sum_j L_j}$$

Where P_L = land productivity

qij = output of the i^{th} crop grown by the j^{th} farmer.

L_j = The size of the net-cultivated land in ropani of the j^{th} farmer.

Output per ropani, on the other hand, is measured as:

$$Q/L = \frac{\sum_i \sum_i qij}{\sum_j \sum_i Lij}$$

Where, Q/L = output per ropani

L_{ij} = ropanies of land used for cultivating the i^{th} crop by the j^{th} farmer.

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