CHAPTER V. CONCLUSION

Like other programming solutions, optimal planning solutions of this study suggest what should be invested or how much limited resources have to be allocated efficiently in order to maximize farm income under present soil conservation practices. The results also provide alternative guidelines for permanent farm planning under different economic conditions.

Since 65 percent of the farmers did not grow rice, the initial model was formulated such that NPVI be maximized subject to land, labor and family expenditure constraints, and without minimum land for rice consumption requirement constraint. The sensitivity analyses were conducted to allow changes in crop prices, wage rate, credit interest rate, discounted factor of net present value of income and labor demand. Furthermore, to incorporate the semi-subsistence nature of 35 percent of the farmers in the study area, the minimum rice requirement has been imposed in order that the model becomes more realistic to some farmers.

Farmers are classified according to farm size into 18 groups. Different labor, capital profile and family size are independent from the farm size and result in different patterns of investment.

The Initial Optimum Plans (IOP) for all groups indicate that lychee is the dominant crop as suggested by the

model and only two groups (5 and 11) should devote only small part of land for rice beside lychee in some of the first five years. This result is quite different with the present situation in which only 20 farmers (30.30 percent) grow lychee and most of them grow coffee and or tea as perennial crops. If the price of lychee increases to 15.00 baht, all groups have only lychee in their farm plans.

Relating to the expenditure and cash money, most of the farmers spend more than 50 percent of total income for consumption needs which cover basic needs (food and cloth), medical treatment, ceremony expense and other expenses, still they have money left at the end of the plans.

The initial optimal plans also show that the wage income has great contribution in generating farm income for all groups. Most of the farmers gain more than 40 percent of their total income from working at two local tea companies during off- season. There is no need for loan even though credit interest rate reduces from 14.50 to 12.00 percent/year. This is possible since the farmers have enough income and savings to support their consumption needs and for lychee investment.

The results of decreasing wage labor demand also prove that wage labor plays an important role in the farm planning because it can change cropping patterns by including rice and coffee in their farm plans beside lychee when off-season labor could be absorbed only at 40 percent and all

groups can be in an infeasible condition when the demand drops further to 20 percent. Wage income decreases as a result of the changes in labor demand situation , farm income also decreases as a result of changing cropping pattern. Generally, NPVI decreases significantly when the level of labor demand reduces to 40 and 60 percent. In this condition, credit becomes important for some groups in order to finance the investment for lychee and coffee. Both expenditure and cash money decrease, but expenditure is still above minimum requirement of consumption needs.

Therefore, it is clear that wage income is really needed in the development of highland permanent farming systems.

Although the discount rate increases to 11.00 percent/ year, there is no effect to cropping pattern for most of the groups. The direct impact on the reduction of NPVI is significant.

Two kinds of sensitivity analysis relating to rice were conducted. The first is an increase in price of rice from 5.00 baht/kg to 5.50, 6.00 and 6.50 baht/kg which do not affect the NPVI significantly and only one additional group (group 9) turns to grow rice besides groups 5 and 11. All groups reduce expenditure as a result of more expensive rice. However, at the end of plan, still cash money increases slightly.

The second is by imposing minimum land allocation for rice consumption according to minimum requirement for each group. This sensitivity analysis is in line with 7th National Economic Development and Social Plan of the country that is to prioritige self-sufficiency. Under this situation, lychee is still a dominant crop. Consequently, farm income, NPVI, expenditure and cash money decrease but insignificantly. On the contrary, there is more labor to be allocated to wage labor activity and thus wage income increases. However the reduction in the monetary return does not mean the reduction in the living standard of the farmers. The farmers perhaps feel more secured. The benefit lifting the rice consumption requirement depend on the farmers' goal and the long term impact of the soil fertility due to repeated rice cropping and the gain from terracing soil conservation to replace grass strips (which accompany rice production).

Like rice, an increase in price of corn from 2.50 baht/kg to 3.00, 3.50 and 4.00 baht/kg, make the three groups (5, 9 and 11) to include corn beside lychee in their plans. They can increase farm income, total income and NPVI even though it is insignificant. But there is a decrease in wage income. Expenditure increases followed by decreases in cash money at the end of the plans.

Tea is not a profitable crop in the model even though there is an increase in price from 7.00 baht/kg up to 10.00 baht/kg. When its price reaches 11.00 baht, three

groups (11, 19 and 20) turn to grow some tea in addition to lychee, but in reality, it is difficult to reach the price at that level. Increasing productivity is suggested to make tea be included in their plans because its present productivity is quite low.

Another important crop in the study area is coffee which is under supervision and promotion policy of various agencies. The price of Arabica coffee is normally set upon the agreement of development agencies and the buyer and the price is normally higher than the market price. However, the fact that market price and thus set price of coffee has declined in the past four years makes coffee less profitable than lychee.

After increasing its price from 42.00 baht/kg to 55.00 baht/kg, four groups (11, 17, 19 and 22) put the coffee as a component of their farm plans. Further increases up to 60.00 baht/kg, all farmers will be able to shift totally from lychee to coffee production although the increase of NPVI and farm income, decrease in wage income , as well as increase in expenditure and decrease in cash money at the end of plans are not significant. The same as in the case of tea, the improved productivity of coffee is one solution allowing farmers to include coffee in their plans. However, it should be noted that for the very remote highlands, where marketing and transportation are difficult, coffee may be preferable than lychee since the latter is perishable and can not be stored.

The sensitivity analysis regarding coffee price verifies the validity of the model that the planning is consistent to the actual situation in this study area (when the price of coffee reaches 60.00 baht/kg).

From the conclusion above, it is clear that the findings provide some valuable information, directions and guidance for the farmers, developers and policy makers in the development of highland permanent farming systems. On the other hand, some limitations of the study which are presented below should be noted and considered for future studies.

1. The construction of the model is based on linear relationships among variables, but the relationship between expenditure and income might be non-linear. Using linear programming tends to come out with decimal and small values which is difficult to apply in real situation, for example size of land cultivation of certain crops. However, round up figures to a quarter of rai is meaningful for small farmers in Thailand since 0.25 rai equivalent to 1 ngarn. The rounding up to ngarn unit provide the same direction of planning only magnitude of return would change. For the better approach, integer programming may be more appropriate.
2. Since this model is constructed basing upon some assumptions (risk neutral and price, rice and corn productivity constant for the whole planning period), the relaxing assumption is desirable and interesting.

3. Soil erosion is one important issue in the development of highland permanent farming systems, but it does not appear in the model since it is difficult to measure considering the limited time of this study.

4. Culturally, the farmers are going to hand down their land to their married children, but this study treats that there is no land division for their children.

5. Simultaneous changes of some economic factors should be undertaken in the sensitivity analyses since these usually occur in reality.

6. Alternative farm grouping, for example, basing on man-land ratio, should be considered.

Regarding the above limitations and alternatives, further research can help to refine a model of this nature.