

CHAPTER 6

Conclusions and Recommendations

6.1 Conclusions

6.1.1 Context

Dakrong district had the same socio-economic characteristics of the highland area of Vietnam. It was characterized by high poverty rate (30.56% in 2013) and over 90% population living in rural area, almost of them were ethnic minority (82%). The people living mainly based on 4.38% of 122,444.64 ha natural land area, in which flat land accounted for only 19.9%. However, agricultural production played an important role in the district economy. The value of agricultural production in 2013 accounted for 69.9% of the total production value of the district, in which, crop production occupied a majority share (81.01%).

Maize was one of main crop in the area with the land area increased by 60 ha per year from 2000-2012 (cultivated area in 2012 was 1,565 ha), being grown in two season (1) spring season was from November and December to March and April and (2) summer season was from April and May to August and September.

Regarding climatic characteristic, there were two distinct seasons in Dakrong, the rainy season, with storms and tropical cyclones characterized by heavy rainfall and strong winds, occurring from September to January; and the dry season, with little rain, lasting from March to early of August. Drought occurred in the dry season with highest daytime temperature was recorded in this season was over 40°C. The high temperature and long sunshine duration combined with the hot dry wind blows from the southwest for about 40 to 60 days a year from April to July, making these months become the hottest period in the year. With climate hazard, Dakrong district had faced all severe climate phenomena of tropical climate area such as, drought, flood and flash flood, storm and cool spells. In which, drought and cool spell were two most severe climate hazards. It was observed from

2003 to 2012, drought occurred around 4 years and faced with cool spell two years. The results from group discussion also indicated that drought influenced on both seasons of maize production, in which, the summer season faced stronger impact.

Three selected communes, Dakrong commune, Mo O commune and Ba Long commune represented three types of terrain distribution and socio-economic characteristic. In which, Dakrong commune represented high terrain with 100% of the population (5,045 people in 2013) are ethnic minorities where maize mainly grown on the hill in two season (spring and summer with the total area of 185 ha (occupied 27.09% of agricultural land area). Mo O commune represented medium terrain, having 73% ethnic minorities (in the total of 2,061 people in 2013) who grew maize mainly on spring season on both the hill and flat land (60 ha or 23.48%). Whilst, Ba Long commune was exactly the opposite when 100% maize was grown at the flat land area by ethnic majorities (2,982 people in 2013). They almost grew maize on the spring season (30.4 ha or 32.48%).

6.1.2 Households' characteristic and drought impacts on maize production

Household survey results revealed that, farmers in three selected communes had high maize production experience (almost 23 years) but low education level, under 5 years in school (farmers in Dakrong commune were only 3 years in school). The household size was as medium scale (5.38 people per household) with almost labors worked in agricultural sector (2.38 in the total of 2.60 household labors), sixty percentage of household heads was men. The poverty rating in the selected communes was high (31.1%), especially, the poor rate in Dakrong commune and Mo O commune was higher, about 50% and 33%, respectively. The difference in age, maize experience, household labor, poor rate was significant among three communes.

The household farm size in selected communes was quite large (11.57 sao per household). Specifically, in the average each household in Bo Long owned around 12.5 sao, followed by Mo O commune, around 12 sao and Dakrong commune 10 sao. In which, maize was grown as a popular crop by farmers in Dakrong with maize area of 4.9 sao/household. In Mo O and Ba Long commune maize area were lower, 2.96 sao and 2.80 sao, respectively. Maize productivity in the study area suffered strong effect of climate factor. In the spring season, it reached 150 kg/sao whilst, in the summer season under impacting of hotter weather, maize productivity was only 111

kg/sao. Especially, in drought year, maize productivity dropped by above 54%, from 144.39 kg/sao in normal year to 65.94 kg/sao in drought year.

6.1.3 Farmer perception on drought

The survey results also showed, farmers were aware of characteristics, effects, causes of drought and coping measures to cope with this climatic phenomenon. However, there was a significant percentage of farmers could not realize the characteristics of drought (5% in total), effects of drought (6.11%), drought causes (44.11%) and coping measures to cope with drought (33.89%). In which, the percentage of farmers who was aware of each characteristic, effect, cause of coping measure was not high. Especially, this rate was often significant lower in Dakrong commune, younger, female, ethnic and poor group. Besides, almost farmers (over 80%) agreed that drought intensity and number of drought day increased significantly recent 10 years. Over eighty five percentage of farmers predicted that temperature continue growing up and drought intensity becoming more severe next years.

Results of evaluating farmer perception level showed the majority of farmers' drought perception were medium level with average score was from 16 to 20 (score), accounted from 50 to 60% for each group of farmers. Especially, the results once again showed that young farmer, ethnic minority, the poor or female groups had significant lower perception than others. This came from their limitation in information approach, economic approach and education or production experience level, etc.

6.1.4 Farmers' adaptation to drought

Farmers' adaptation practice was found to be close ties with their socio-economic characteristics when farmers in richer commune having better adaptation than other communes'. The majority of the farmers were applying one or two practices (almost 65%) in which, using cultivating one season (57.22), inter-cropping and changing to another crops (23.89 for each) were the main options. Another adaptation measures were applied by a small percentage of households. It was also found that farmers in Ba Long and Mo O commune were more likely to adapt by cultivating one season (88.33% and 58.33%, correspondingly), changing to another crops (40.00% and 21.67%, respectively). Whilst, farmers in Dakrong commune applied inter-cropping and

cultivating one season as the main adaptation options (43.33% and 25%, respectively). The difference in adapting coping measures was significant among communes.

Five main adaptation practices, were grouped into three groups (1) farmers adapted by improving in cultivation techniques (ADP_1), including: changing sowing day or planting the drought tolerant varieties or practicing inter-cropping; (2) farmers adapted by reducing in cultivated area (ADP_2), including: cultivating one season or changing to another crops and (3) farmers adapt by combining measures in ADP_1 and ADP_2 (ADP_3). These adaptation groups were used as categories of a dependent variables which was used in Multinomial Logit model to analyze factors impact on.

6.1.5 Factors impact on farmers' adaptation in maize production

The using of factor analysis detected six main factors which containing independent variables with high loading values, being used in the model. The first factor is termed as “household's capitals” consists of ethnicity, education, household type, access to information, access to credit and drought perception level. The second factor appeared to be “experience”, including two variables with high loading value: age and maize experience. The third factor is composed of distance from market, maize land area and maize income. This factor is named as accordingly to its common meaning, termed as “maize production scale”. The forth factor represents the maize productivity, including maize productivity in the normal years, maize productivity in the drought years. Whilst, factor five represents the labor force of household which is combined by household size and total household labors. The last factor is the combination of gender and non-farm income.

The Multinomial Logit model indicated that, there were four in six factors significantly impacted on maize adaptation options of farmer in the area. The significant impacted components in these factors related to 4 terms: individual characteristics, socio-economic characteristics, information and credit approach and perception level (Figure 6.1). In which:

- Individual characteristics such as ethnicity, education and gender were significant and negative impact on no adaptation group (ADP_0). Whilst, these components along with maize experience were significant and positive impact on adaptation by combing measures (ADP_3).

- Similarly, household type, maize land area, maize income and non-farm income, distance from home to market (in socio-economic characteristic term), access to information and access to credit (in information and credit approach term), and perception level (in perception on drought term) were significant and negative impact on ADP_0 and positive impact on ADP_3.

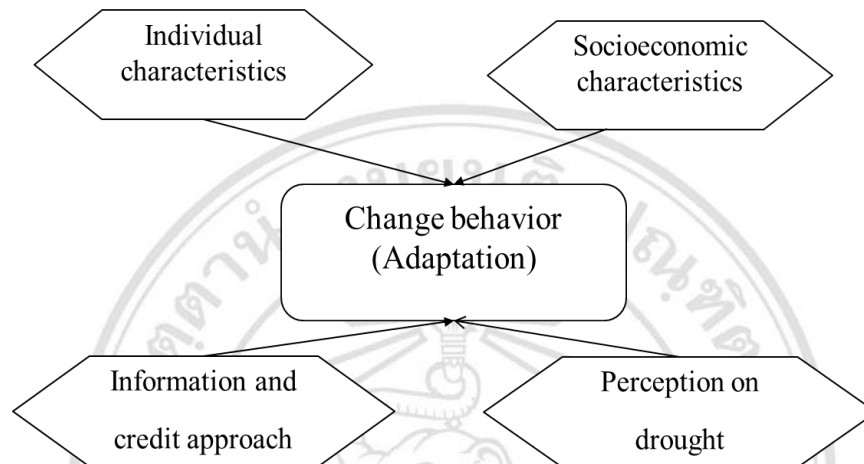


Figure 6.1 Factors impact on farmers' adaptation in maize production.

- Whilst, ADP_1 and ADP_2 were significantly impacted by maize land area, maize income and distance from home to market (socio-economic characteristic term). These components positively and negatively influenced on ADP_1 and ADP_2, respectively.

6.2 Recommendations

To be summarized, the following points appear to be considered and implemented for the improving of farmers' perception and adaptation in the area.

Firstly, to improve farmers' perception on drought, strengthening communication activities and training for farmers are two important responsibility with stakeholders in the area. In specific:

- Related officials and agencies must often convey information about climate change, climate hazards to farmers. Especially, they need to provide exactly climatic information to farmers at the beginning of each production season and at times of drought and other climate hazards likely to occur. These activities can be done through a loudspeaker system in each commune or integrated in village

meetings or by mass organizations such as the farmers' groups, women's groups. The information regarding climate phenomena or drought will be very useful for farmers in their making production decision.

- Extension workers, local officers in charge of agriculture should pay attention on training and disseminating knowledge about drought as well as introducing coping measures for farmers, especially, the poor, ethnic minorities and women to increase their coping capacity. This activity is necessary because the research result indicated that the drought perception of the poor, ethnic minorities and women was significant lower than other farmer groups. The good awareness on drought will contribute to encourage the creation of farmers in seeking useful coping measures to cope with drought on their fields.

Secondly, to enhance farmers' adaptation in maize production to cope with drought, the below solutions should be carried out simultaneously:

- Agricultural and Rural development Department, Extension Station and related agencies should evaluate the effectiveness of the current adaptation models to find out the most appropriate adaptation models for each area (slope land area and flat land area). In which, the combination measure (reducing ineffective maize land area and increasing intensive investment for the remaining area) should be more concerned.
- ARDD and Extension Station need to continue to fulfil the experimental inter-cropping models between maize and other crops in order to find out the appropriate and efficient inter-cropping formula, combining with supporting resistant varieties, production technologies for farmers.
- ARDD, Extension Station and related agencies should find out and introduce to farmers good maize varieties which are not only good drought tolerance but also good cold tolerance. This kind maize variety will more useful when farmers move the sowing day earlier to cope with drought.
- Cultivating one season (spring season) is one of the most popular coping measure in the area. However, the related agencies and next researches should pay attention on finding out the suitable crops or crop varieties for the summer season.
- Seed subsidy program should continue to be maintained and the high level agencies (province level) should expand more beneficiaries instead of just

applying for the poor households. Along with that, the local government needs to monitor the use of seeds which were provided for farmers to ensure that the use seeds on the right purpose.

- With the slope land area, developing the irrigation system is impossible. However, it can be applied for flat land area. Thus, Ba Long commune and a part of maize land area in Mo O commune can invest and develop the irrigation system to maize fields. It very important solutions to cope with increasingly drought under the impact of climate change today.
- As results from the analysis model, individual characteristics such as female, low education level, ethnic minority and low perception level farmers were less likely to apply coping measures than others. Thus, open training courses to train and encourage farmers apply coping methods every years is very necessary. Farmers be trained through practice in their field (FFS method) instead of being taught by theory. Besides, Commune People's Committee, Village Board and farmers' organizations need to create favorable conditions for farmers to approach loans. They need to be the unsecured organizations for farmers in borrowing loan from the bank to cope with drought. Especially, these agencies should pay more attention on the poor who area not enough mortgaged property.

Moreover, the local knowledge of success farmers also should be concern and disseminate in the community to other farmers can learn and apply by themselves. Especially, some of area farm already have good self-practice to avoid or adaptation to drought should be further supported and disseminated to other farmers.

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