

Farmers' Perception and Adaptation to Climate Change Pressure in Highland Coffee Production, Dak Lak Province, Vietnam

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Abstract

Climate pressure is considered as a major concern for agricultural development and a potential threat to coffee production in particular. Temperature and rainfall factors interfere in the crop phenology, and consequently in productivity and quality. The process of adaptation depends on understanding farmers' perception of the nature of climate change, evaluation of information, and also by perception of one's own capacity to adapt, or self-efficacy. Adaptation to changes of temperature and rainfall is a two-stage process, which initially hinges on the farmers' perception of climate variability and then responding to changes through adaptation strategies. Adaptation evaluation is considered as part of a planned policy coping with consciously planned, primarily anticipatory adaptation initiatives undertaken by decision makers, specifically individual farmers. An evaluation goes beyond the identification, characterization of adaptation approaches, and with regards to an adaptation option's relative merit, superiority or implement-ability. Evaluative criteria do not only mention on principally economic dimension, but also relate to the different considerations.

The study aims to: (1) understand farmers' perception about climate pressure, (2) evaluate the adaptation options and determine the factors influencing farmers' choices for adaptation options for dealing with climate pressure, and (3) estimate coffee yield and the profitability of farmer groups with different adaptation capacity levels. The study used data from structured interviews with 176 coffee farmers in Ea H'leo District, Daklak Province, Vietnam.

The study conducted a comparison between the climate data recorded at the meteorological station and farmers' perception of these changes in order to examine farmers' perception of climate pressure. The Likert Rating Scale and Chi-Square analysis results revealed that the temperature had increased and the contrary, a decrease rainfall during over the last ten years; farmers' perception about the change pattern also appeared to be in accordance with the statistical data record in the region. There were 77.27 percent of the farmers perceived the temperature in the Ea H'leo District to be increasing and around 66.48 percent respondents observed changing in rainfall pattern with a decrease in the amount of rainfall.

The multiple criteria evaluation, unity based normalization and weighted sum methods are employed to assess the farmers' adaptation options. The Ordered logit model is also used to estimate the relationship between the farmers' adaptation level and their demographic and socio-economic characteristics. The result of the multiple criteria evaluation indicated that

amongst five evaluative criteria such as economic efficiency, effectiveness, flexibility, farmer implement-ability and independent benefits; the economic efficiency and effectiveness were assessed with the highest weights about importance level. The results showed that there were 101 farmers adjusted to one adaptation option; 54 respondents adapted to two options and 21 remaining farmers acclimatized to three options. The major adaptation options were selected for their coffee farms included the crop diversification, irrigation techniques and soil conservation. However, the outcome of the weighted sum of adaptation options highlighted that the level of adaptation was not a positive relationship with the number of adaptation options which the farmers adapted to climate pressure for their coffee farm. It depended on the adaptation's multiple considerations. Results revealed that the groups who adapted to irrigation techniques, crop diversification, and irrigation techniques parallel had the highest sum of weight and two criteria involving in economic efficiency and effectiveness were strongly evaluated for these adaptation groups. In the total of 176 coffee farmers, the low adaptation level, which had the weighted sum from 2.15 to 2.49, constituted 26.14%. The weighted sum which ranged between 2.50 and 2.84 was considered as the medium adaptation group comprised 42.61% while the high adaptation was evaluated with equal or over 2.85 of weighted sum and took up 31.25%. In addition, the findings of regression model also explained that factors likely education, coffees growing experience, coffee farming size, coffee income, non-coffee income, access to credit, access to climate information, access to extension services, and irrigation option had statistically significant impacted to choosing adaptation options at significant level 1% and 5%. Age and gender of the household head were negatively insignificant correlated with adaptation levels.

Gross margin analysis results presented that the group of high adaptation level obtained the highest profitability with average of gross margin 74.51 million VND per hectare per year per household through selling coffee at a higher price, adapting efficient irrigation techniques and high knowledge for applying appropriate adaptation strategies for their coffee gardens. The low and moderate adaptation groups gained the average of gross margin lower with 24.63 and 68.65 million VND per hectare per year per household respectively.

The findings of this study will be considered as a preliminary analysis and set up a foundation for possible future research related to improving and developing the planned or proactive adaptation strategies for dealing with climate pressure in agriculture.

Keywords: climate change, perception, adaptation evaluation, Robusta coffee