

INTERNAL AND EXTERNAL FACTORS AFFECTING FARMERS' GROUP CAPABILITY IN ADAPTATION ON CLIMATE CHANGE

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Abstract

Main problems faced by farmers group is their low capability, include in anticipating impact on climate change. This paper analyzed internal and external factors that affect farmer groups' capability in adaptation on climate change. The data were collected from Indramayu District, West Java Province, that had ever experience in both flood and drought climate change impact. Data were collected through structured questionnaire and analyzed quantitatively. Both internal and external factors consisted of several aspects (elements), with the scale of answers ranged from 1 (one) indicating not adequate, to 4 (four) indicating very adequate. Results showed that the level of competence of farmers' group members on climate change adaptation were less adequate. Efforts to handle the climate change in farmers' group level hindered by insufficient knowledge, financial, and infrastructures. The capabilities of farmer groups in dealing with climate change impacts are relatively weak.

Keywords: *farmers' group, capability, climate change*

Introduction

Climate change is an unavoidable phenomena that can cause unexpected conditions such as flood, drought, pest and diseases. Studies found that climate change that most noticeable in the agricultural sector is the destruction and degradation of land resources, production and productivity of food [1][2][3]. Policy efforts to strengthen adaptation strategies, the National Council of Climate Change [4] had recently had a special site known as the IACC (Indonesian Adaptation on Climate Change). The purpose of the IACC is to disseminate information related to the effort of adaptation programs and policies.

Not all climate change impacts can be addressed through government policy and public collective actions in a group of farmers. In this case, the farmers' group is defined as organized group of people in social engineering (political) of government, advocating for community empowerment, networking organization of the market economy, and grow from the strength of local culture [5]. The impact of climate change can be reduced and anticipated. Early preparation and anticipation to reduce the negative impacts of climate change can be pursued through increasing farmers' group capability.

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A main problem faced by farmers group is of low capability among their groups. One out of the problem is in anticipating climate change. Indirectly it's reflected by low economic competitiveness of rural communities, widespread symptoms of poverty and hunger in rural areas, and even less maintenance of natural resources and local environment.

Based on these considerations, it is necessary to conduct a research related to climate change issues, particularly related to capability of farmers group in adaptation to climate change. However, to avoid partiality and traps in short-term orientation, the research was focused towards provide input for the Ministry of Agriculture, in order to increase the multidimensional capabilities of farmers' group.

Research objective is to analyze: internal and external factors that affect capability of farmer groups in adapting climate change. The final result of this study was expected to provide benefits to various parties, including: researchers/scientists, policy makers, and farmers.

Methodology

The study was conducted through survey, using primary and secondary data. Primary data were collected through farmer group discussion while secondary data were collected from related institutions such as Agricultural Ministry at provincial, district, sub-district and village level. The factors that influence adapting capability of farmers to climate change was analyzed through a quantitative analysis, using a weighted average. Both internal and external factors consisted of several aspects (elements), with the scale of answers ranged from 1 (one) to 4 (four). To obtain answers of scale aspects of internal/external factors was used weighted average:

$$SE_i = n_1/N.1 + n_2/N.2 + n_3/N.3 + n_4/N.4,$$

Meanwhile, the response of all internal factors (SFI) or external factors (SFE) were calculated using the formula:

$$SFI = [Se_1 + Se_2 + Se_3 + \dots + Se_k] / K.$$

Research location was determined base on climate phenomena i.e. 'floods and droughts', in West Java. Based on secondary data and related information, the sample was

Indramayu District that had ever showed both phenomena, in which in this location there are 2 (two) as well as climate change phenomena, flood and drought.

Sampling method applied was purposively on farmers groups in areas experienced in adaptation toward drought and flood. Therefore the unit of analysis was farmers groups. The sample of groups were 20 farmer groups, consist of 10 groups experienced with floods and 10 groups with drought. Each group was represented by its managers and members who reflected variation of members. Beside groups, there were 16 respondents such as local officers at the provincial, district, sub-districts and village levels as well as experts on climate change.

External And Internal Factors Affecting Capabilities

A. External Factor

There are 3 (three) external factors related to the ability of farmers groups in facing climate change, that is floods and droughts.. External factors include: the availability of the technology, information, and infrastructure in rural areas. Influence of these factors on the capacity of farmer groups in facing climate change presented in Table 1.

Table 1. External Factors Affecting Capability of Farmers’Group in Facing Climate Change

Item	Flood	Drought
Availability of technology	2,4	2,5
Accessibility of adaptive technology	2,2	2,4
Availability of climate information system	2,4	2,5
Availability of climate information system	2,2	2,4
Supporting infrastructure	2,2	2,4
Average	2,28	2,44

Notes: 1= not adequate; 2= less adequate ; 3= adequate ; 4=very adequate

Supporting the external factor to address climate change in the form of flooding is less adequate (2.28). Likewise, in times of drought, the support of external factors to increase capacity (and capability) farming is less adequate (2.44). Flooded (wet season) is almost routine occurs in rice fields in Indramayu District (West Java). This occurs due to sedimentation in reservoirs in Jatiluhur can not accommodate excessive water during the rainy season. Besides the three factors above, the extension affect the increasing capabilities of farmer groups (Table 2)

Table 2. Extension Factor which Affects the Capability of Farmer Groups in Facing Climate Change

Item	Floods	Droughts
Flood/Drought	1,8	2,6
Climate change impact	1,7	2,6
Adaptation to climate change	1,8	2,6
Average	1,77	2,60

Notes: 1=not adequate; 2= less adequate ; 3= adequate ; 4=very adequate

B. Internal Factors

1). Leadership and management. Leadership and management factors have a major impact on the dynamics of farmers' groups. These factors are important to determine the organizational capabilities of farmer groups in facing of climate change. Leadership factor in the management of farmers' groups is presented in Table 3.

Leadership factor to address climate change in flood, tend smaller than that of drought. This suggests that farmers are less prepares to face symptoms of flooding. Drought can be regarded as a phenomenon that happens almost regularly every year, while flooded only happens once in a while, or after several years. In other words, the cycle of drought is relatively more frequent, so the vision to enhance the capabilities of the group to face the drought is more aware naturally.

Table 3. Leadership Factors that Influence Farmers' Groups in Facing Climate Change

Item	Flood	Drought
Long-term vision	2,0	3,0
Expertise in communications	2,6	2,7
Altruistic attitude	2,6	3,0
Special abilities	2,2	3,0
Acceptability	2,2	3,0
Conflict resolution	2,4	3,0
Rationality and systematic attitude	2,4	3,0
Articulation of democracy	2,2	2,9
Enforcement of rules / fairness	2,4	2,9
Alignments on the weak	2,8	3,0
Average	2,38	2,95

Notes: 1 = not adequate; 2= less adequate ; 3= adequate ; 4=very adequate

Management factors which affect the capability of farmers' groups is presented in Table 4. There is a relationship between leadership and social management. The higher the quality of leadership in farmers group organization, tend to be followed by high quality of social management. Elements of social management that have a high impact on capability, is transparency and accountability

Table 4. Management factors which affect the capability of farmer groups

Item	Flood	Drought
Transparency	3,0	3,0
Accountability	2,8	2,9
Democracy	2,4	3,0
Inclusive participation	2,6	2,8
Rationality	2,4	2,8
Disclosure of audit	2,6	2,8
Adaptive / flexibility	2,4	2,9
Science payload	1,8	2,7
Average	2,50	2,86

Notes: 1=not adequate; 2= less adequate; 3= adequate; 4=very adequate

2) *Farming activities of farmers' groups*. Table 5 showed, the activities which directly related to agriculture and give positive contribution to group dynamic is: setting the cropping pattern, irrigation, procurement of production facilities, and joint marketing. Gathering activities are generally used as an attraction to present in regular meeting. It is no coincidence that social gathering activities can function as a media for "friendship" between members of the group. In addition, the media gathering also serves as an easy way to save money or build a credit system.

Table 5. Group Activities in Responding to Climate Change

Item	Flood	Drought
Regular meetings	2,5	3,0
Media gathering	1,6	2,7
Labor exchange	1,6	3,0
Cropping pattern arrangement	3,0	3,0
Cropping system arrangement	3,0	3,0
Regulation of irrigation	2,6	3,0
Procurement of production facilities	2,8	3,0
Harvest and post harvest management	2,5	2,9
Marketing	2,0	2,9
Management of joint venture	2,4	3,0
Average	2,40	2,95

Notes: 1= not adequate; 2= less adequate ; 3= adequate ; 4=very adequate

3) Facilities and capital. Table 6 describes the availability of facilities and financial capital to support farmers deal with climate change. It appears that in general the availability of facilities and financial capital at the level of farmers' groups are still far from adequate to cope with the impacts of climate change: flood (2.20) and drought (2.23). With the weakness of these factors, it will be difficult for farmers to have a reliable capability to respond climate change impacts.

Table 6. Factors of Facilities that Affect Farmers Group's Capabilities In Facing Climate Change

Item	Flood	Drought
Means for adaptation to climate change	2,6	2,3
Ability of financial capital	2,0	2,2
Ability to access financial capital	2,0	2,2
Average	2,20	2,23

Notes: 1= not adequate; 2= less adequate ; 3= adequate ; 4=very adequate

4) Knowledge and Ability of farmers 'groups. Table 7 describes the level of knowledge and ability of farmers 'group about climate change. In general it can be said that the knowledge level of farmers' groups to the problem of climate change is less adequate (floods 2.43 and drought: 2.44). There are several points that explain why the level of knowledge of farmers on the issue of climate change is relatively low, namely: technology adaptation, lack of training and education technologies, lack of participation in the climate field school, and understanding of climate change. Knowledge of farmers related to the flooding problem is almost same as the drought.

Table 7 . Farmers' knowledge about Climate Change

Item	Flood	Drought
Climate elements	2,4	2,4
Climate change	2,4	2,5
Potential impacts of climate change	2,5	2,6
Technical anticipation of climate change	2,4	2,5
Technical adaptation to climate change	2,3	2,4
Rice varieties	2,8	2,8
Technology adaptation to climate change	2,5	2,6
Training / education technology	2,4	2,1
Participation in the climate field school	2,2	2,1
Average	2,43	2,44

Notes: 1= not adequate; 2= less adequate ; 3= adequate ; 4=very adequate

Capability of farmers to respond the impacts of climate change can be traced through how big the problem can be solved. Table 8 describes the response of the management group and human resource competencies in the group, linked to climate change. In general it appears that the management responses to flood and drought tend to adequate (2.74 and 2.76).

Table 8. The ability of groups and human competencies factors in Responding to Climate Change Problem

Item	Flood	Drought
1. Response the managements group	1,90	2,75
- Manager	3,1	3,2
- The second board	1,0	2,8
- The third board	1,0	2,6
- Member	2,5	2,4
2. Human resources competencies	2,74	2,76
- Functional Skills	2,3	2,4
- The ability of co-operation	3,0	2,9
- Emotional Maturity	3,0	3,0
- Adherence to the rule	2,8	2,8
- The appreciation of innovation	2,6	2,7

Notes: 1= not adequate; 2= less adequate ; 3= adequate ; 4=very adequate

There is a gap on the response of the management group, in case of flood (1.90) and drought (2.75). However, the response about climate change at the level of managers in the case of floods and droughts is quite adequate (3.0). Responses on the second and third board are very low or nonexistent. Ability of manager in eliciting cooperation in groups determines capability groups, especially in response to the impact of climate change.

Competence within the group members generally tend to be quite adequate. In the case of flooded, the level of competence in the farmers' group members tend to be quite adequate, that is 2.74. Likewise, in the case of facing a drought, the competences of members of farmer groups are not much different, that is 2.76. This confirms that the factor of lack ability and knowledge to overcome the impacts of climate change is crucial to improve the capability of farmers in responding to climate change.

Conclusions and Recommendations

1. Capability of farmer groups in dealing with climate change impacts is relatively weak.

This is considering that farmers' groups are formed not to address climate change, but

rather to increase food production (rice) at the level of rural farming. Almost no direct link between the issues of forming farmers' groups, with the issue (impacts) of climate change on national food security. Therefore, it can be understood as in responding to climate change, farmer groups seem unprepared and awkward.

2. The mission of farmer groups formation is more emphasized on how to run the farming activities in small scope, not to build the whole productive economic system for the village. The orientation of farming for rural communities is not solely to generate subsistence products at the household level, especially rice, but also to increase income in the household.
3. There are two factors that influence the group capability in adaptation toward climate change such as: internal factors which can be managed by the farmers and external factors that can not be managed by the farmers. The internal factors consist of technical, economical and social. While external factors that influences the group capability consist of: the availability of adaptive technologies, climate information system, coordination system on climate change impact, and extension services related to climate change.
4. Farmers group faced internal obstacles such as knowledge on adaptive technologies and capabilities in facing the climate change. Efforts to handle the climate change in farmer's group level hindered by insufficient knowledge, financial, and infrastructures. In order to cope and anticipate the impact of climate change on national, local and household, it is need to build synergies between the institutions of central government, provinces, regional, institutional, private economy, and institutional farmer groups.
5. Local and central government through the relevant institutions should develop early warning system of climate change. The development of such systems needs to be supported by hardware development (climate monitoring equipment), institutional development, and human resource capacity. Some basic information should be generated are: (1) the estimated magnitude and the time period of climate change, (2) the estimated area that is potential of negative impacts, and (3) the estimated magnitude of the negative impacts that may result
6. Climate information system that is developed should provide benefits to the agricultural sector and are able to reach out to groups of farmers or farmers in rural communities. The main function of the system is to deliver climate information generated from monitoring early to farmers quickly and accurately. To be worthwhile,

the institution must provide information of weather forecast or climatic conditions, long before the growing season so that the groups of farmers are able to anticipate climate change that will happen.

7. Increasing the farmers capabilities related to technical and managerial as well as productive economics. The productive economics needed in adaptation to climate change is integrated farming systems through planting metode design, farming product marketing/promotion, wider goals and market segment and improving the labor capabilities.

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