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Social Innovation Among Ethnics in Cocoa Farming at Sulawesi, Indonesia

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Abstract
This study conducted in the Island of Sulawesi, precisely in the province of West and South Sulawesi, Indonesia. The purposes is to (i), determine the development pattern of social innovation and in the government innovation in cocoa farming among ethnics of Javanese, Buginese and Mandar in the island of Sulawesi, (ii) explore the influencing factors that differentiated the development of social innovation in cocoa farming among ethnics of Javanese, Buginese, and Mandar in the island of Sulawesi, Indonesia. The result showed the development pattern of social innovation in Mandar and Buginese ethnic relatively similar, which rely on innovation that based on the local resources and tend to adopt external innovation. While Javanese ethnic learnt from their experiences (internal innovation). This pattern of innovation mostly adopted by farmers with land under one hectare. However, cocoa farmers with land more than one and two hectares showed the same pattern among ethnic of Buginese, Mandar and Javanese. Factors that influenced development of innovation in each ethnic depicted in level of productivity. Buginese cocoa farmers tend to expand their land to increase productivity, Mandar famers tend to utilize local resources and Javanese farmers more focus on intensification of innovation in order to increase productivity. Generally, Buginese and Mandar farmers not accustomed to working in groups, on the contrary Javanese farmers are more productive with group innovation.
Keywords: Innovation, Social, ethnic and cocoa.

1. Introduction

Wide spread of cocoa cultivation in South Sulawesi Indonesia started from the events of DI / TII rebellion lead by Qahar Muzakkar, which started from his birthplace now known as Luwu district (Ruf and Yoddang; 2005). Cocoa then grew rapidly in South Sulawes up to entire island of Sulawesi, even to few other islands in Eastern Indonesia. The result not only increased farmer incomes, but raised local trade to export; encouraged capital accumulation and re-aaccumulation in these villages, also led to a massive migration of rural population to the lowland centers development of the cocoa. Cocoa has transformed socio-economic systems in rural villages and plateau toward commercial-capitalist social formations through a major change by the adoption of cocoa. Same thing happened in the Western part of Nigeria, when cocoa production was adopted by a number of manufacturers, causing economic growth and structural change in the social and economic institutions. Cocoa growing spread in Nigeria through the efforts of migrant farmers, many of whom rely on traditional systems, with non-economic institutions to mobilize economic resources they need to build a cocoa farm (Berry, 1974).

In South Sulawesi, inland and plateau villages have varies types of commodity products. These areas produced food and horticultural crops such as corn, vegetables, fruits and livestock that supply the urban and rural areas, as well as the production center of clove, cocoa, coffee, and vanilla which become leading export commodities. When the economic crisis hit Indonesia in the late 1990s, these commodities were the backbone of the rural economy so the people do not feel the impact of the crisis (Ruf, Yoddang and Ardhy, 2001; Ruf and Yoddang, 2001; Penot and Ruf, 2001).

Farmers at inland and highland in West and South Sulawesi have innovation model that grow internally even external innovation model has less influence, precisely innovation from within the community itself is very significant in driving change.

In the case of cocoa development in the form of smallholder cocoa (farmers owned) in Sulawesi can be used as an example of how innovation from within the community working for the structural social and economic changes in the plateau region. South Sulawesi cocoa and generally in Indonesia, can be seen as the emergence of diverse innovation momentum, and with it many other innovations are represented (Ruf and Yoddang, 2005). The data showed innovation in the cocoa plantation management both from within (internal) or external, impacted in increase farmers' income. The application of high technology programs conducted by the government of Ghana to increase cocoa productivity, which began in 2003, has provided a very significant result that the average increase in productivity by 72% (Bosompem et. All, 2011).

Innovation should be seen as an iterative process between individuals and organizations with different types of knowledge in a particular context (World Bank, 2007). The important question to be asked is how to facilitate the process of agricultural innovation. Research conducted by Klerkx et, al. (2008) about the process of

agricultural innovation in Europe and more particularly in the Netherlands, showed that the main obstacle to innovation is the lack of coordination. Klerkx et, al. (2009) tried to build a thesis to address the problem in the agricultural innovation by making innovation broker as the answer to strengthening agricultural innovation capacity. They concluded that the roles of system of innovation brokers can encourage innovation system interaction and interconnection between the main actors with the key factors: research, extension and education. This research also showed that innovation brokers have assisted farmers and other related stakeholders to consider about new possibilities to sustain their business and support in building network. The important of implementing innovation system in the practice of agricultural development have been widely recognized in international community of development expert (Rajalahti et al. 2008). Rajalathi et al. (2008) identified networking and partnership as an important activities to improve the function of innovation system. According Rajalathi, the main actors in the agricultural innovation systems is manufacturer, research and extension, traders and transporters, agro-industry and retailers. Thus, the success of the agricultural innovation system, is largely determined by the ability to form a collaboration, and facilitate interaction among the stakeholders with a special focus on stimulating agricultural innovation through value chain development, market chains, and networking (Bernet et al., 2006; Sanginga et al., 2004; Heemskerk et al., 2003). These authors concluded that the key to successful business development is a combination of building and maintaining the quality of partnerships among stakeholders in the agricultural sector, while building human and social capital needed to ensure effective collaboration.

A number of studies on how to improve the system of agricultural innovation in developing countries has been going on for years. The World Bank is one of the institutions that support the national innovation system as a strategy to reduce rural poverty.

In the 2007 World Bank publication, the innovation system is defined as: "a network of organization, companies, and individuals that are focused on how to invent new products, with the new processes and the new forms into economic use, together with the institution also policies that influence system of behavior and performance. Innovation system helps to create knowledge, provide access to knowledge, sharing knowledge and encourage the learning process. Innovation system concept includes not only the science suppliers, but totality of the interaction of actors involved in the innovation system "(World Bank 2007).

During its development, the agricultural innovation system is not only focus on the material and the invention of new technologies, scientific knowledge and economic reasons, but other important aspect that is how to put social position as object and subject that influence the development, diffusion and innovation (Edquist 2001) . This thinking in innovation theory called social innovation. Geels and Schot (2007), advocated the development of social innovation requires a new method, which is characterized by the co-design or co-construction that can work together with the community. As a result, various innovation actors must make changes in research and development, with no longer exclusive dominance of science and business: but how to consider a balanced relationship between science, market and civil society. Exchange and combination of knowledge is an important element in the process of social innovation.

The debate about the precedence between technical innovation and social innovation started to a serious conflicting paradigms and sustained challenge (Knickel et al. 2009).

New innovation system approach emphasizes the importance of social mechanisms as a basic element in the development stage. Innovation is seen born with collective and creative process, with the mutual exchange of knowledge and learning. Learning is no longer structured as a linear transfer of knowledge from teacher to student, but in the form of mutual exchange of knowledge and experiences, socially, with a circular process such as spiders webs, where the combination of different sources and diverse types of knowledge to create something new (Oreszczyn et al. 2010). The types of learning itself is innovative because it allows to penetrate the constellation of actors for cross-border collaboration, which come from different backgrounds and have different interests (Tovey 2008). Innovation with collective and creative learning methods will be able to generate new skills, new products and practices, as well as new attitudes and values (Wiskerke et al. 2003; Lamine 2005; Rist et al. 2007; Bruckmeyer & Tovey 2008 ;).

This study is intended to first, determine the development pattern of social innovation and in the government innovation in cocoa farming among ethnics of Javanese, Buginese and Mandar in the island of Sulawesi. Second, this study explores the influencing factors that differentiated the development of social innovation in cocoa farming among ethnics of Javanese, Buginese, and Mandar in the island of Sulawesi, Indonesia.

2. Metodologi

The research was conducted on the island of Sulawesi, specifically in South and West Sulawesi, the two provinces that have largest cocoa plantations with most number of cocoa farmers in Indonesia. Ethnic Buginese and Mandar are the majority inhabitants in these two provinces.. Other major ethnic groups in South Sulawesi and West Sulawesi are Makassarese, Toraja and Javanese. Ethnic Makassarese and Toraja have closer values,

norms and indigenous knowledge with ethnic Buginese and Mandar. To get the development pattern of social innovations that represent the ethnic diversity the selected ethnics are Buginese, Mandar and Javanese, although the number of Javanese ethnic are insignificant compared with other ethnic population of Makassarese and Toraja in South Sulawesi and West Sulawesi province.

To obtained comprehensive information about ethnic of Mandar and Javanese, the research was conducted at the district of Polman in West Sulawesi. While for ethnic of Buginese the research was conducted at the District of North Luwu and Soppeng in South Sulawesi. These three districts are the center of cocoa development in West and South Sulawesi and while the farmers also representing the ethnic of Buginese, Mandar and Javanese.

Information and data in this study was obtained through in-depth discussions with individual farmers, with groups numbering 10 to 15 farmers and groups of farmers over 15 people, in each ethnicity. Individual farmers who are the respondent/ source of information consist of three types in each ethnic; 3 farmers with a land area of less than one hectare; 3 farmers who owned less than two hectare, and 3 farmers with a land area of more than two hectare. Total 27 farmers were interviewed from three different ethnics. While a number of farmers groups interviewed are six, two groups in each district which consist of one group of 10-15 members (farmer) and a one group of over 15 members (farmers).

3. Result and Discussion

3.1 Social Innovation and Government

In general, a prominent cocoa farmer innovation is in in eradicate cocoa fruit borer/CPB (Conopomorpha cramerella Snell). This innovation began to be found around the early 1990s, no available resources that explain ethnicity who started this innovation. In the early 1990s almost all cocoa farming in South and West Sulawesi province implement this innovation. Innovations against CPB pest among others are: using the red ants, make a small fire of palm leaves, burn grass or used tires between rows of cocoa plants before sunset, or paint the cocoa pod with gasoline. All of these innovations bringing positive results for some cases individuals or groups, though not much of a solution for all cocoa farmers.

Partially shifting cultivation method is also an innovation against CPB pests. This mostly used by cocoa farmers of Buginese ethnic. In some areas such as in North Luwu or Soppeng district, the farmers expand their land by opening new land in other districts, or in the hills of the mountain. This innovation successfully maintain sustainability of cocoa production in South and West Sulawesi province. New farm in the hills of the mountain withstand three to five years not attacked by CPB pests.

In West Sulawesi in the late 199 0's, Javanese farmers choose strategy of intercropping cocoa with coconut as a precaution CPB attack. Because the coconut market is still considerable potential if the income from cocoa decline, farmers can rely on their coconut trees. In the use of pesticides, in South and West Sulawesi, many Buginese farmers spontaneously adopted pesticides, even before CPB appears. They took advantage their relationship with plantations in Sabah Malaysia to smuggle pesticides. Especially in South Sulawesi, Buginese farmers in the district of North Luwu for example,a year after PBK attacks, they started spraying pesticides on a regular basis.

Innovation not only from within the cocoa farmers community, but also from the government in both provinces of West & South Sulawesi.Few of government innovations are; Pruning eradication system is the total pruning by removing young branches. With this method, the tree left almost without leaves and fruit for 12-18 months. Innovation is ecologically ideal as regarded by the community, but often fail due to a misconception of technique, financial and social. Secondly, bagging technique is where the fruit wrapped in a plastic bag to prevent insects lay their eggs on the cocoa pod and prevents larva enter into it. Unfortunately, this innovation requires a lot of manpower although quite effective in controlling CPB. Bagging is proven technically acceptable, but not cost effective. Third, plundering combined with spraying is when the CPB attack is identified, immediately all fruits and cherelles (advanced stage between the flowers and unripe fruit) were harvested. To have better success of this innovation the Department of Agriculture and the local government (district of Polman, Soppeng and North Luwu) helped mobilize farmers from neighboring villages, civil servants, students, and sometimes the army to help harvest the crops. Although farmers do not suffer in the short term period because they can sell the pods harvested, but they suffered impending loss in six months later due to the significant loss of cherelles after they ripe.

Fermentation is an innovation seriously encouraged by the government in the early 1990s,but all farmers across ethnic groups studied assessed it as ineffective, since very small margin between fermented and unfermented cocoa beans.

3.2 Innovation Pattern among Ethnics

Shown in table 1, that every ethnic has different innovations character, for example Buginese ethnic demonstrate the ability of fertilization of innovation using local resources and knowledge, while adopting external innovation (government) that uses chemicals (non-organic). Relatively similar to ethnic of Mandar, though innovations that

utilize local resources and knowledge less varies. Javanese are more inclined to adopt external innovations than innovation based on local knowledge and resources, although there are some new internal innovations within the ethnic.

Table 1, Innovation among farmers ethnicity based on cocoa farming activities in South and West Sulawesi.

Activity	Ethnicity of Farmers		
	Buginese	Mandar	Jawa
Fertilization	- Dispensing organic fertilizer from rice water, coconut water, decomposed leaves and fruits, crushed and fermented for five days. - Use ZA (Ammonium Sulfate), KCL, and TSP fertilizer -Organic fertilizer from manures and decomposed leaves.	- Wrapped coconut fiber around bottom of the tree trunk to help absorption of fertilizers. Coconut fiber also used as fertilizer after decomposed. - Use ZA, KCL (Potassium Chloride), and TSP (Triple Super Phosphate) fertilizer - Replace UREA (Ammonium) fertilizer with NPK (Nitrogen, Phosphorous, Potassium)	- Use urea & ZA fertilizers, decomposed *lamtoro* leaves. - Incentives fruits with liquid mixed of brown sugar, red onion and MSG. - Replace urea and ZA fertilizers with homemade fertilizer of urea Alike and Sifin. - Use urea and ZA fertilizers and organic fertilizer. - Replace urea and ZA fertilizers with NPK. - Use ZA dan Phonska and fertilizers.
Pests & Disease Control	**Rotten fruit;** -Used fungiside & *"Bazoka"* **CPB**; - Utilized natural enemy of CPB (red ants) to eradicate CPB pests -Fumigation around the cocoa trees -Spread gasoline around the tree -Spray mixture of garlic, red onion and brown sugar. **Stem Cancer** - Spread mixture of grind turmeric, garlic, chalk and betel leaves on the identified stem cancer. **Stem Boarer;** - Filled the holes with battery powder - Pour mixture of detergent and water into the drill holes **Insect**; - Spray organic liquid mixed of bay leaves, red onion and brown sugar.	**Rotten fruit** : - Use fungiside & *"Bazoka"* **CPB**: - Use "*Kaptur*" - Used "*Meteor*" - Spray liquid mixed of garlic, red onion and coconut water. - Use PROMO **Stem Cancer**: - Spread mixture of grind turmeric, chalk and water on the identified stem cancer - Use mixture of garlic and betel leaves. **Stem Boarer**: - Use *PROMO* - Filled the holes with clay or a piece of woods to kill the pests. **Insect** - Use mixed of garlic, bay leaves and coconut water.	**Rotten fruit** : - Use "*Pigor*" - Use immersion of ashes - Routine maintenance (pruning, weeds control and sanitation) **CPB**: - Routine maintenance (pruning, weeds control and sanitation) **Stem Cancer**: - Use "*Bentos*" **Stem Boarer**: - Put dishwashing soap into the holes to killed the pests. **Insects**: - Use "*Kloromit"* - Fumigation by burning weeds and rotten cocoa leaves. **Weeds and Grass**: - Use natural herbicide made of cocoa water - Use pytho - herbicide made of red onion, pepper, sugar, coconut water and yeast.
Shade Plant	Coconut trees and *Durian* trees.	Maintenance of cocoa trees as shade plant	Replaced *lamtoro* trees with lanzon trees
Rejuvenation	-Side grafting technique	Side grafting technique	Side grafting technique and new plants

Table 2, Innovation among farmers ethnicity based on land size and farmers group.

Types of Group	Buginese		Mandar		Javanese	
	Innovation	Productivity/Ha/Yr	Inovation	Productivity/Ha/Yr	Inovation	Productivity/Ha/Yr
Farmers with Land under 1 hectare	Based on local resources, natural and organic	0,4	Based on local resources and adopted external innovation (government)	0,42	Based on local knowledges and experiences	0,5
Farmers with Land under 2 hectare	Based on local resources and adopted non-organic material of external innovation	0,53	Highly adopt external innovation and not fully utilize non-organic materials	0,51	Based on local knowledges, modern and adopted external innovation (government) and innovation broker	0,64
Farmers with Land over 2 hectare	Highly adopt external innovation and fully absorb non-organic innovation.	0,67	Highly adopt external innovation and not fully utilize non-organic materials	0,63	External innovation of modern technology and fully utilize non-organic materials	0,74
Farmers group of 10-15 members	Innovation based on local knowledge and resources.	0,6	Innovation based on local resources and knowledge	0,58	External innovation through innovation brokers and extension workers based on modern knowledge	0,71
Farmer group of >15 members	Adopted external innovation (government) through innovation broker	0,55	Adopted external innovation (government) through innovation broker	0,53	External innovation through innovation brokers and extension workers based on modern knowledge	0,72

Innovation in controlling pests and diseases, such as rotten fruit, CPB, stem cancer, stem borers, and insects in ethnic of Buginese and Mandar dominantly use inorganic materials, and natural enemies, while Javanese,tend to use chemicals, and apply a bit of innovation with the use of organic materials such as immersion of ashes and detergent. For pests and diseases control, Javanese is more focused onroutine maintenance namely, pruning, weed control and sanitation (table 1).

There are several types of shade trees on cocoa plants, in the early days in South and West Sulawesi in general use Gliricidia trees and lamtoro trees as shade plants. The last fifteen years the shade trees began to shift functions and types. Buginese and Javanese ethnics use shade plants that have economic value, namely durian and lanzon trees, while Mandar ethnic still mainly use coconut tree as a shade plant. In the last five years, farmers in South and West Sulawesi utilize shade plant as additional source of income, especially if the cocoa crops attacked by pests and disease and not economically viable.

Innovation characteristics of cocoa farmers viewed when viewed from the size of land owned tend to have different patterns. Ethnic of Buginese with a land area of less than one hectare shows the development of innovation based on available local resources, are natural and organic. In Mandar ethnic while also based on local resources, but has begun adoption of external innovation (government). Javanese ethnic shows a somewhat different innovations compared to ethnic Buginese and Mandar, they make farming experience as a basis for the development of innovation, coupled with local knowledge (table 2).

In Table 2 also depicts farmers with land area more than one hectare, Buginese farmers innovation development based on available local resources and adopt external innovations and implementation of innovations already using inorganic materials. While Mandar ethnic adopt external innovation massively, but not fully utilize inorganic materials. Innovations developed in Javanese farmers combine local knowledge, modern and adopt external innovations (government) through innovation broker.

Buginese farmers who owned over two hectare of land have high rate of external innovation with non-organic materials. The same case in Mandar ethnic, rate of adoption of external innovations is very massive, but not fully absorbthe innovations that use inorganic materials. While Javanese farmers with a land area of more than two hectare, has adopted modern technology of external inovation and fully use of inorganic materials (table 2).

Cocoa farmers in groups of 10-15 people, ethnic of Buginese and Mandar, as illustrated in Table 2, the development of innovation rely heavily on local knowledge and local resources. Whereas Javanese ethnic, have

adopted external innovation with modern knowledge-based, brought by innovation brokers. Farmers group of over 15 members, both Buginese and Mandar ethnic have adopted external innovation (government) through innovation broker. While Javanese already entered the stage of developing a modern knowledge-based external innovation from extension & innovation broker.

Pattern of innovation by category of land area and number of members of farmer groups that impact productivity vary in every ethnicity. Buginese ethnic farmers with under one hectare of land area, have lower productivity levels when compared with the two other ethnic groups, which is only 0.4 tons /hectare /year. Mandar ethnic have slightly better than productivity of Buginese, namely; 0.42 tons /hectare /year, while Javanese productivity levels had reached 0.50 tons/hectare/year. Buginese ethnic farmers who owned between one to two hectares of land, has a productivity rate of 0.53 tons / hectare / year, while productivity of Mandar and Javanese farmers respectively 0.52 and 0.64 tons / hectare / year. Buginese and Mandar farmers with land area of over two hectare each have productivity of 0.67 and 0.63 tons / hectare / year. While the Javanese farmers with the same area of land has the level of productivity of 0.74 tons / hectare / year. Productivity level of farmer groups of 10-15 members on Buginese ethnic is 0.60 tonnes / hectare / year, while productivity level of farmers group on ethnic Mandar and Javanese, respectively 0.58 and 0.71 tons / hectare / year. Farmer groups of over 15 members had their productivity 0.55 tons / hectare/ year for ethnic of Buginese, 0.53 tonnes / hectare / year for Mandar ethnic, and 0.72 tons / hectare / year for Javanese ethnic.

This study is intended first, to determine the pattern of social innovation development and innovation in the government's cocoa farming among ethnic Javanese, Buginese and Mandar on the island of Sulawesi. Second, this study explores the factors that influence the differences in the development of social innovation in cocoa farming among ethnic Javanese, Buginese, and Mandar on the island of Sulawesi, Indonesia. Thirdly, want to know the innovation channel for each ethnicity.

4. Conclusion

Patterns of social innovation development in ethnic Buginese and Mandar relatively similar in patter, both rely on innovation based on local resources and tend to adopt external innovations. While the Javanese ethnic tend to learn from experience (internal inovation). Pattern of innovation is especially true in the cocoa farmers who have an average area of land under one hectare. Cocoa farmers who have more than one hectare of land and an area of over two hectares showed the same pattern of innovation among ethnic, Buginese, Mandar and Javanese, both massively adopt external innovations (from government) through innovation brokers, and massive use of non-organic innovations in farming. Farmer groups with members between 5 - 15 people, innovation thrives on ethnic Buginese and Mandar based on local resources and local knowledge. While Javanese ethnic based on the modern external innovations where its adopted from the broker. Farmer groups with over 15 members showed that innovation in all ethnics increasingly open to adopting external innovations.

Factors that influence the development of innovations in each ethnic from level of productivity are: Buginese ethnic of cocoa farmers tends to innovate in expansion of land to increase their income, Mandar ethnic likely to utilize local knowledge to increase productivity, while the Javanese farmers focus more intensification innovation to improve productivity. Buginese and Mandar farmers generally not accustomed to group innovation, their productivity levels tend to decline if they work in groups, the greater the members of cocoa farmers in groups on ethnic Buginese and Mandar, the lower the productivity. Ethnic Buginese and Mandar have a better level of productivity at the individual farm in the area of one hectare. The larger the farm area for ethnic Buginese and Mandar, the higher the productivity. Contrary, Javanese farmers are able to increase productivity by groups innovation; the number of members in group is directly proportional to the level of productivity.

In the case of cocoa farmers in South Sulawesi and West Sulawesi province, the three ethnics; Buginese, Mandar and Javanese, innovation evolved from various parties, internal and external of community of cocoa farmers. Innovation channel in three ethnic groups contributed by multistakeholder innovators: traders, smugglers, migrants, large estates, the government projects, the farmers themselves, influential individuals, even military where farmers itself as a major innovator.

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