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Examining Farmers' Intention Towards Conservation Cocoa Farm in Bone Regency by Using Theory of Planned Behavior

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ABSTRACT
Cocoa is one of Indonesia's critical agricultural commodities cultivated by an estimated one million farmers involved and is an economic force in rural areas. This study investigates smallholder farmers' intention towards conservation activities on their cocoa farms. Conservation agriculture is an agroecological approach to crop production that is sustainable and resource-efficient. The framework of this study is focused on Ajzen's theory of planned behavior (TPB) to test variables antecedent of farmer's intention are Attitude, subjective norm, knowledge, perceived risk, and perceived behavior control toward farmer's intention to conserve on their cocoa farm. Using quantitative research methodology, the self-administered questionnaire collected responses from 150 farmers across 3 villages in Lamuru Sub District of Bone Regency. Stratified random sampling is used, and to measure the relationship between variables, partial testing with T-test and simultaneous testing using the F-test were used. The results indicated that Perceived Risk and Perceived Behavior Control significantly affect farmers' attention to practice conservation on cocoa farms. Furthermore, all antecedent variables, Attitude, Subjective Norm, Knowledge, Perceived risk, Perceived behavior control, simultaneously will have a significant effect on the intention of farmers to practice conservation on cocoa farms. Another finding the risks faced by the farmers in the study area and frequently experienced by farmers are pests and diseases attacks.

Keywords: *Cocoa Farm, Conservation, Theory of Planned Behavior*

1. INTRODUCTION

1.1. Related Work

Increased worldwide cocoa demand in the new millennium and ongoing deforestation and degradation linked to cocoa have motivated a search for long-term solutions to boost cocoa yields. Cocoa cultivation has long been known to promote deforestation and pollution, but it was only recently brought to light. Rising consumer and industry awareness led cocoa and chocolate manufacturers to publicly commit to ending deforestation in their supply chains at the 2017 UN Climate Change Conference [1]. Cocoa plantations in Indonesia have developed quite rapidly in the last 20 years. The area of cocoa plantations in 1997 was recorded at 0.53 million ha. The area increased by 204% in 2018. Currently, cocoa smallholders (98.33%), 0.77% are managed by State plantations, and the remaining 0.90% are private plantations. The main cocoa production centers in the last 5 years are Central Sulawesi, South Sulawesi, Southeast Sulawesi, West Sumatra, West Sulawesi, Lampung and Aceh [2].

Cocoa in Indonesia, cultivated by about one million small farmers, is an essential economic driver in rural areas. Indonesia is the third-largest producer of cocoa beans, thus placing it as one of the primary cocoa producers in the world after Ivory Coast and Ghana [2]. South Sulawesi's Gross Regional Domestic Revenue (GRDP) growth, the plantation sector in 2013-2017 experienced a significant increase with a growth value of 17.84 trillion Rupiah. From 9 export commodities, cocoa is the highest export value of US$ 67,521 or contributes 66.19% of the total export value of South Sulawesi, becoming the second-largest cocoa-producing center in Indonesia. The smallholder cocoa area in South Sulawesi Province is 91.24%, spread over ten regencies with an enormous contribution above 10% coming from 2 regencies, namely North Luwu (21.139%) Luwu (19.72%), while eight other regencies contribute under 10 %. The remaining 8.76% is a contribution from other regencies [2]. Bone Regency is one of the cocoa development areas programmed in the Provincial Strategic Area. Based on plantation statistical data [3], Bone Regency is one of the regions in South Sulawesi with an extensive cocoa cultivation area after North Luwu and Luwu Regencies, and the most significant number of farmers is 32,582. With an area of 22,900 ha of smallholder cocoa farms, with a production of 10,692 tons. From the total production, it can be said that the

productivity level is still low at 0.542 tons/ha when compared to the national average productivity of 0.7 tons per hectare [3]. And the regions that make a significant contribution to cocoa production in Bone Regency are Lamuru, Lappariaja, and Libureng sub-districts.

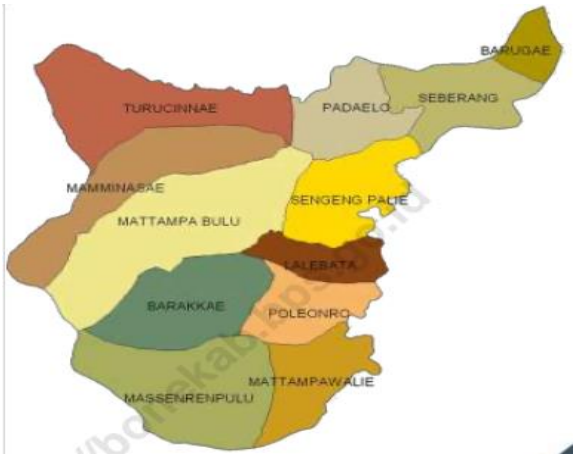

Figure 1. Map of Bone Regency and Map of study area Lamuru Sub District.

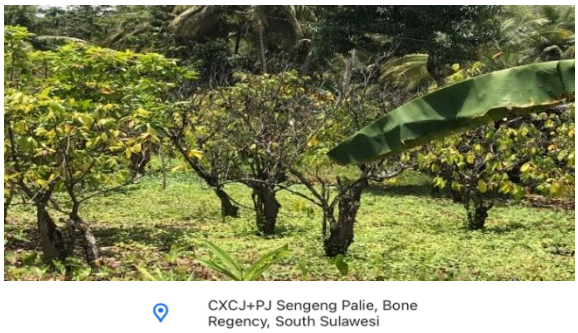

Figure 2. Smallholder cocoa farm in the study area

Various factors caused the decline in cocoa productivity in South Sulawesi, (a) human resource factor (knowledge and skills), (b) lack of the implementation of good farming practices, (c) farmers using cocoa varieties not superior, (d) lack of conservation soil and water (e) cocoa maintenance (pruning, fertilization, drainage/irrigation, weed control), which is not appropriate, (f) pest and disease management is low [4]. Furthermore, cocoa farming carried out by farmers still prioritizes experience passed down from generation to generation in the family and the result of interactions with other farmers in their community [5].

The two most significant reasons for low production are aging trees and pest infestations [6]. 'Sustainable agricultural intensification is widely discussed as a potential solution [7]. Several studies discovered that the contribution of conservation agriculture to the environment is crucial, and its benefits over conventional farming have been widely acknowledged [8]. Conservation agriculture is considered an agroecological approach to the sustainable and resource-saving crop production system [9]. Increasing productivity by reducing shade and increasing the use of chemical inputs may ultimately decrease the economic security of small farmers. Therefore, shade provides many ecological benefits, and once removed, farmers become dependent on chemical inputs that may not always be affordable. Improving cocoa yields does not require full-sun and agrochemicals instead, increases in labor inputs such as regular pruning can reduce pests and increase yields [10]. Many of the present issues faced by farmers (climate change, variable weather, pests, and disease) can be traced back to methods that have reduced biodiversity. By worsening natural conditions, deforestation and agricultural growth have harmed farms. Less biodiversity, for example, means fewer pollinators and fewer cocoa beans. Farmers benefit directly from forest tree planting by having a healthier farm, better pollinator habitat, water retention, reduced scorching winds, natural soil enrichment (with nitrogen-fixing trees like Gliricidia or Acacia) fewer pests and diseases. Agroforestry can even provide new sources of income (fruits with mango trees and kola nut trees; or hardwood) or community services (firewood, fodder for animals) [1].

Despite the lack of data on agroecological consequences in current and former main cocoa production areas in Bone Regency, signs of land degradation such as low cocoa production, a drop in economic activities, soil fertility depletion, food insecurity, and a decrease in cocoa-cultivated surfaces in former "cocoa belts" are visible. This suggests that more research into how smallholder farmers might be promoted is still needed to practice conservation on a cocoa farm. Previous studies have primarily focused on adopting technological innovations, and trim work has been done on the socio-psychological behavior of farmers regarding sustainable practices on cocoa farms. Understanding the farmers' intention towards conservation cocoa farm practices and private approaches to sustainability can improve cocoa smallholder's Bone Regency, increase their income, and enhance environmental conditions. The theoretical framework and its application to cocoa smallholders are described in the following section, defining the hypotheses to be investigated. Based on this notion, a working model was developed to assess farmers' intentions to practice conservation on their farms. The next part outlines the data collection and analytical processes used to test the hypothesis and the empirical outcomes. The final section of the paper is devoted to discussion and conclusions.

1.2. Theoretical Framework

Theory Planned Behavior is used to study the cocoa farmers' intention to practice conservation on cocoa farms. TPB has widely been used to understand human-environmental behavior because of its usefulness in identifying the main factors affecting the associated decision-making process [11]. TPB proposes that intention mediator attitude, subjective norms, and perceived control explain actual behavior [12].

Specifically, attitude indicates the individual's belief concerning the outcome of performing a behavior (behavioral beliefs) and the evaluation of those results [13]. Subjective norms are defined by how the individual weights "important others" expectations regarding a particular behavior corresponding to informal rules [14], including perceived behavioral control to explain aspects outside the individual's intention and behavior. Perceived control measures the individual's opinion about their ability to carry out a particular behavior, and the term can be used interchangeably with self-confidence or self-efficacy [15]. In TPB, perceived control has an indirect effect through intention but could also directly affect behavior if it were strong enough to be used to measure actual control [16]. Intention can be defined as a person's position on a subjective probability dimension linking with a relation between himself and several actions [17]. Another definition is the intention as the motivation for individuals to engage in a particular behavior [18], on the other hand, defines. According to the Theory of Planned Behavior model (TPB), the intention is the immediate determinant of individual behavior, whether to perform or not. The Theory of Planned Behavior (TPB) is a socio-psychological model that seeks to understand the human behavioral intention and assesses how individuals' intentions transform into specific behaviors [9].

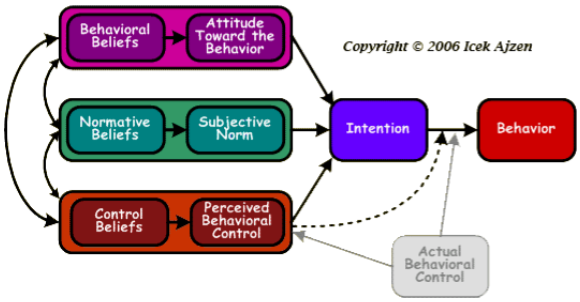

Figure 3. Schematic representation of theory planned behavior

People are expected to follow out their intentions when the opportunity occurs if they have a sufficient degree of actual control over their actions. As a result, the immediate antecedent of behavior is presumed purpose. However, because many actions have execution issues limiting voluntary control, it is essential to think about perceived behavioral control and intention. To the extent that it is accurate, perceived behavioral control can be used as a proxy for actual control and can help forecast the behavior in the issue. [18].

2. METHOD

2.1. Study Area and Sampling Procedure

This study was carried out in Lamuru sub-District, Bone Regency, South Sulawesi Province, Indonesia (See Fig. 1). This is one of the leading cocoa productions. Natural and human factors have severely harmed its ecology. Several community-based development activities have been implemented in the study region. Farmers have been urged to use various sustainable methods to boost yields and overcome challenges in the decline of cocoa production. Lamuru Sub-district is composed of 12 villages.

Three villages were chosen as a study area, and farmers in these three villages, like in all other parts of the Lamuru sub-district, mainly rely directly on cocoa farms as their livelihood. Stratified random sampling is used to measure the attitude, subjective norms, perceived behavioral control, perceived risk, and intention to conserve their cocoa farms. Using Stratified random sampling, a total of 150 respondents, comprising cocoa smallholders from cocoa-growing areas in Lamuru Sub-district, i.e., Sangeng Palie, Mattampa Bulu, Massenreng Pulu. I participated in this survey. After consultation with agricultural professionals in the area, many conservation measures were discovered, including soil and water conservation, agroforestry, biological control, row planting, crop diversification, compost application, use of farm-yard manure zero-grazing, and weed management. These behaviors were divided into three categories: (a) commonly used in the last five years, (b) scarcely embraced, and (c) newly introduced.

2.2. Designing the Questionnaire

This study used a structured questionnaire to collect data divided into two sections. The first section collected information about their cocoa farm's socio-economic characteristics, risk factors, farmer age, education level, farm size, frequency training, and farmer experience. Attitude, subjective norm, knowledge, perceived risk, and perceived behavioral control are the second part driver variables of the farmers' behavioral intents toward conservation on their cocoa farm.

2.3. Data Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. First, descriptive statistics were utilized (e.g., percentages, means, and frequencies). Second, employing hierarchical regression models to identify the most significant elements influencing farmers' intention to practice conservation on cocoa farms in Bone regency. Besides descriptive statistics, to measure the relationship between variables, a partial test with T-Test was used with criteria are if the significant value (sig.) is smaller than the error level of 5% (0.05). The hypothesis is accepted and Simultaneous testing using the F-test. The test criteria are if the significant value (Sig.) is less than 5% (0.05), it can be concluded that the hypothesis is accepted.

3. RESULT

3.1. Risks Identification

The study found that cocoa smallholders face risks in this area, as shown in Table 1.

Table 1. Farmers face risks in the study area

Risk Perceived	Frequency	Percentage (%)
Most Severity:		
- Pest and Disease attack	85	56.70
- Drought	40	26.70
- Flood	15	10.00
- Storm	10	6.70
Most Frequent:		
- Pest and Disease attack	90	60.00
- Drought	30	20.00
- Flood	17	11.33
- Storm	13	8.67

Based on farmers' experience, the most severity faced in cocoa farming in this area, respondents ranked pest and disease attack as highest 56.70%, followed with drought 26.70%, Flood 10.00 % and the lowest is storm 6.7%. Furthermore, the most frequently, 90 farmers ranked insect and disease assault as the most common risk they faced, followed by 30 farmers who chose flood as the second most common risk, 17 farmers who ranked flood, and 13 farmers who ranked storm.

3.2. Social Economy Profile

Table 2. Respondents' social economy profile in the study area.

Variables	Description	Frequency	Percentage (%)
Age (years)	25-29	30	20.00
	30-39	37	24.67
	40-49	43	28.67
	50-59	25	16.67
	≥60	15	10.00
Education Level	Not finish elementary school	27	18.00
	Elementary school	42	28.00
	Junior High School	37	24.67
	High Senior School	35	23.33
	Bachelor and above	9	6.00
Farm Size	Small (0.4 ha)	28	18.67
	Medium (0.5-1 ha)	72	48.00
Frequency training	Large (> 1 ha)	50	33.33
	Low (<3)	67	44.67
	Medium (4-6)	50	33.33
	High (>6)	33	22.00
Farmer experience (years)	1-10 years	66	44.00
	10 – 20 years	52	34.67
	> 20 years	32	21.33

Table 2 According to the study's descriptive statistics, most of the respondents (28.67 %) were between 40 and 49. Most respondents (28%) only finished elementary school. In comparison, 18% did not complete elementary school, (24.67%) did not complete junior high school, (23.33%) did not complete senior high school, and only 6% completed their education with a Bachelor's degree above. Majority size of farm is medium (0.5-1 ha) (48%), Large (>1 ha) 33.33% and small (0.4 ha) only 18.67%. Frequency of training attended, a majority is low (44.67%) and followed medium (33.33%) and high (22%). Farmer experience is majority (1-10 years) is 44 %, followed (10-20 years) 34.67 %, and more than 20 years is 21.33%.

3.3. Factors Affecting Intention Toward Conservation on Cocoa Farms

The intention to practice conservation on cocoa farms as the dependent variable are attitude, subjective norms, perceived behavior control. At the same time, the perceived risk is an independent variable with hierarchical regression analysis. Testing the model's accuracy was carried out to determine how precisely the independent variables used could explain the dependent variable. Decision-making is based on the R-Square value, resulting from the correlation value.

Table 3. R-square value

R	R Square	Adjusted R Square	Std. Error of the Estimate
.780	.608	.540	.58096

Based on Table 3, the R-value (correlation) is 0.780, and the R-Square value is 0.608. The R-Square value indicates that the independent variable understudy can explain 60.8% (0.608 x 100%) of the dependent variable while the remaining 39.2% is influenced by other variables not examined. The value of 60.8% indicates that the independent variable in the study has a good level of accuracy (>60%). The hypothesis in this study was tested partially and simultaneously. Partial testing aims to determine the effect of each independent variable on the dependent variable. Simultaneous testing determines the independent variables' impact on the dependent variable.

3.3.1. Partial Test

They tested the relationship between variables using a partial test with a T-test. The test criteria are if the significant value (sig.) is smaller than the error level of 5% (0.05), then the hypothesis is accepted.

Table 4. T-test Result

Model	Standardized Coefficients	t	Sig.
Attitude	.158	.511	.613
Subjective Norm	-.010	-.078	.938
Knowledge	-.500	-1.534	.136
Perceived risk	.251	2.114	.043
Perceived Behavior Control	.458	2.549	.016

Referring to Table. 4. above and the Error value in the R-Square value table, the multiple regression equation can be arranged as follows:

Y = 3,101+ 0.131ATT- 0.017SN - 0.424KNO + 0.360PR + 0.380PBC + 0.581

The interpretation of the T-test results in the Multiple Regression Tables and Equations can be described as follows:

1. The regression coefficient on the condition that the independent variable's value remains (constant) is 3.101 with a significant value of 0.003.
2. The regression coefficient of the Attitude (ATT) variable is +0.131 and has a significant value of 0.613. Based on the coefficient value, each increase in ATT can increase the farmer's attention by 0.131 units. Referring to the significant value, which is greater than the 5% error level (0.05), it can be concluded that the hypothesis is rejected that attitude has no significant effect on farmers' attention to practice conservation.
3. The regression coefficient for the Subjective Norm (SN) is -0.017 and has a significant value of 0.938. Based on the coefficient value, each increase in SN can reduce the possibility of the farmer's attention rate by 0.017 units. Referring to the significant value being greater than the error level of 5% (0.05), it can be concluded that the hypothesis is rejected that the area of the subjective norm has no significant effect on farmers' attention to practice conservation.
4. The regression coefficient of the Knowledge (KNO) variable is -0.424 and has a significant value of 0.136. Based on the coefficient value, each increase in KNO reduces the possibility of the farmer's attention by 0.424 units. Referring to the significant value being greater than the error level of 5% (0.05), it can be concluded that the hypothesis is rejected that knowledge has no significant effect on farmers' attention to practice conservation.
5. The regression coefficient for the Perceived Risk (PR) variable is +0.360, and the significant value is 0.043. Based on the coefficient value, each increase in PR can increase the farmer's attention by 0.360 units. Referring to the significant value, which is greater than the 5% error level (0.05), it can be concluded that the hypothesis is accepted that the attitude has a significant effect on farmers' attention to practice conservation.
6. The regression coefficient for the Perceived Behavior Control (PBC) is +0.380, and a significant value is 0.016. Based on the coefficient value, each increase in PBC can increase the farmer's attention by 0.016 units. Referring to the significant value being smaller than the error level of 5% (0.05), it can be concluded that the hypothesis is accepted that Perceived Behavior Control has a significant effect on farmers' attention to practice conservation.

3.3.1. Simultaneous Test

Simultaneous testing using the F-test. The test criteria are if the significant value (Sig.) is less than 5% (0.05), it can be concluded that the hypothesis is accepted.

Table 5. F-Test Result

Model	df	Mean Square	F	Sig.
Regression	5	3,037	8.997	.000
Residual	29	.338		
Total	34			

Based on the table.5. it is shown that the significant value is 0.000. Therefore, it can be concluded that the hypothesis is accepted (Sig. < 0.05). The factors of attitude, subjective norm, knowledge, perceived risk, and perceived behavior control will significantly affect the intention of farmers to practice conservation on cocoa farms.

4. CONCLUSION

The study was shown that the farmers' intention could be predicted using attitude, subjective norms, knowledge, perceived risk, and perceived behavioral control to practice conservation on cocoa farms. However, the findings also suggest that partially variables antecedent of farmer's intention, perceived risk, and perceived behavior control significantly affect farmers' attention to practice conservation on cocoa farms. If all antecedent variables that attitude, subjective norm, knowledge, perceived risk, perceived behavior control simultaneously will have a significant effect on the intention of farmers to practice conservation on cocoa farms. The risks faced by the farmers in the study area, pests, and disease are a common occurrence for farmers. On the other hand, pest and disease attacks are the most serious of threats faced by farmers in terms of severity and economic loss.

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