

# The Social Capital Influence on the Adoption Rate of Patchouli (*Pogostemon Cablin Benth.*) Technology in Aceh Jaya Regency

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**Abstract:-** Acehnese patchouli is regarded as the best quality type of patchouli in Indonesia because it has the highest oil content. Patchouli has the potential to become a priority in the economic development of Aceh Jaya Regency. Social capital is an important factor for patchouli farmers in adopting new technologies for patchouli cultivation and processing. This study aims to analyze the influence of farmer's social capital on the level of adoption of patchouli technology (*Pogostemon cablin Benth.*) in Aceh Jaya Regency. The research method used in this study was Structural Equation Modeling (SEM) with the Partial Least Square (PLS) method approach. The data in this study were analyzed using SmartPLS 3.0 software. The number of respondents were 34 patchouli farmers. The results showed that trust has a significant influence on technology adoption. Social norms, social networks, however, farmer characteristics have no significant influence on innovation adoption.

**Keywords:-** Social Capital, Adoption of Technology, Patchouli, SEM PLS.

## I. INTRODUCTION

Patchouli (*Pogostemon cablin Benth.*) is one of the important essential oil producers. According to Mangun (2005), in Indonesia there are three types of patchouli namely Aceh patchouli (*Pogostemon oil benth.*), Javanese patchouli (*Pogostemon heyneanus Benth.*) and soap patchouli (*Pogostemon hortensis Benth.*). Aceh patchouli is the best type of patchouli of the three types of patchouli because it has the highest oil content of 2.5 to 5 percent and Patchouli Alcohol (PA) is above 30 percent. Nuryani (2006) found that there were three varieties of patchouli that produced high oil content and PA, namely Lhokseumawe varieties with 3.20% oil content and 32.63 PA, Tapaktuan varieties 2.83% and 33.30%; and the Sidikalang variety by 2.89% and 32.95%, respectively.

One of the centers for patchouli oil production is Aceh Province. As a leading commodity, patchouli is cultivated in almost all areas of Aceh. Aceh patchouli varieties are known as superior varieties, namely the Tapaktuan and Lhokseumawe varieties. Based on the decisions of the Minister of Agriculture No. 320/Kpts/SR.120/8/2005 and 321/Kpts/SR.120/8/2005 in August 2005 the Lhokseumawe and Tapaktuan varieties were designated as national superior varieties along with the Sidikalang variety from North Sumatra. In 2019 Aceh Province produced 354 tons of

patchouli with a planted area of 1,252 ha (Ministry of Agriculture, 2020). Patchouli production centers in Aceh Province include Gayo Lues Regency, South Aceh, Aceh Jaya, West Aceh, Southeast Aceh, and Great Aceh Regency.

The potential of patchouli has not been able to ensure the maximum yield of patchouli oil. Patchouli productivity in Aceh Jaya Regency is still low compared to the results of research on superior patchouli varieties. Whereas the patchouli varieties cultivated are superior patchouli varieties, namely the Lhokseumawe, tapaktuan and Sidikalang varieties. Patchouli in Aceh Jaya Regency produces 288 kg/ha of patchouli oil under the Lhokseumawe variety 355 kg/ha and the tapaktuan variety 375 kg/ha patchouli oil. This means that Aceh Jaya's patchouli production capacity is 76.80 percent of the Tapaktuan variety and 81.13 percent of the Lhokseumawe variety.

To make patchouli a regional superior product and increase the quantity and quality of patchouli oil, the government and research institute (ARC Syiah Kuala University) collaborated with patchouli farmer groups and cooperatives in Aceh Jaya Regency. The government makes Aceh Jaya Regency a patchouli innovation cluster in Aceh. One of the innovations is the stainless steel patchouli refining kettle. Stainless steel boilers have been used in the cooperative's distillery. The use of stainless steel kettles is expected to maintain the quantity and quality of farmers' patchouli oil.

The process of using innovation requires community participation, especially patchouli farmers. The social capital that exists in the community affects the increase in the resulting output. Social capital is an important factor for patchouli farmers in adopting new technologies for patchouli cultivation and processing. Farmers who have high social capital seen from the value of trust, social norms, and social networks have an influence on increasing yields that are beneficial to the community itself (Putnam, 1995).

The social capital approach can examine the values contained in the farmers and the readiness of patchouli farmers to accept new innovations. In addition, social capital is able to see problems and how to overcome problems in adopting the use of new technology. Problems in the form of information and lack of understanding of new technologies resulted in farmers not knowing the results of these technologies. This happens to patchouli farmers in Aceh Jaya Regency who have not used new technology to its full potential due to lack of information and knowledge. Strong

social capital for patchouli farmers can encourage the implementation of new technologies well, fast and sustainably.

**II. LITERATURE REVIEW**

Social capital is a set of shared values or norms among group members that allows for cooperation among group members (Fukuyama, 1995). The emphasis on social capital lies in the norms that are shared among the same social groups. Social capital will become stronger if in a society the norms of mutual assistance and co-operation are coherent through a network of social institutional relations. Putnam (1995) defines social capital as the relationship between individuals, social networks, norms of reciprocity, trust, and facilitated by coordination and cooperation to achieve common goals. Social capital is not limited to interaction relationships that involve certain people's behavioral factors, but can also involve individuals in groups that form a social network. The definition of social capital by Putnam (1995) refers to three components, namely trust, social norms and social networks. The role of social capital in society is to reduce poverty (Nasution, 2015), improve the welfare of farming households (Putra et al., 2017), increase farm productivity (Ernanda, 2018) (Kholifa, 2016), facilitate the flow of information (Bulu et al. al., 2009) and adopting new technologies more quickly and easily (Nato, Shauri and Kadere, 2016) (Bulu et al., 2009). The hypotheses of this research are:

H<sub>1</sub>: Trust has a significant influence on the level of adoption of patchouli technology (Pogostemon cablin Benth.) in Aceh Jaya Regency.

H<sub>2</sub>: Social norms have a significant influence on the level of adoption of patchouli technology (Pogostemon cablin Benth.) in Aceh Jaya Regency.

H<sub>3</sub>: Social networks have a significant influence on the level of adoption of patchouli technology (Pogostemon cablin Benth.) in Aceh Jaya Regency.

H<sub>4</sub>: Farmer characteristics have a significant influence on the level of adoption of patchouli technology (Pogostemon cablin Benth.) in Aceh Jaya Regency.

**III. RESEARCH METHODOLOGY**

This research was conducted in Aceh Jaya Regency, Aceh Province. Determination of the research location is done purposively. The time of the study was carried out in November – December 2021. The sample in this study were all members of the Aceh Jaya Patchouli Industry Cooperative. The list of names of cooperative members is obtained from the cooperative management. These names became the basis for researchers to visit and interview respondents with the help of research questionnaires. Respondents were 34 patchouli farmers with details of 10 farmers in Panga Sub-district, 15 farmers in Darul Hikmah Sub-district and 9 farmers in Sampoiniet Sub-district. Interviews were conducted with a research questionnaire guide. The questionnaire in the survey consists of several parts of questions including the respondent's characteristics (age, gender, number of family members and others), the social capital section, the technology adoption section and an open-ended question section for conditions and obstacles to

the adoption of patchouli technology in Aceh Jaya Regency. Observations were made by observing the respondents and the research place which were documented in the form of photo documentation. Quantitative data obtained from the questionnaire was then analyzed using Structural Equation Modeling (SEM) with the Partial Least Square (PLS) method approach. The data in this study were analyzed using SmartPLS 3.0 software. The results of the PLS SEM analysis data aim to measure the influence of social capital on the adoption of patchouli technology through the values of trust, norms and networks in Aceh Jaya Regency.

**IV. RESULTS AND DISCUSSIONS**

Social capital in this study is the value of trust, social norms, and social networks owned by every 34 patchouli farmers in adopting stainless steel boiler technology in Aceh Jaya Regency. Testing the hypothesis of the influence of social capital on the adoption of patchouli technology is done by looking at the t-count value. If the t-count > t-table, then there is a significant influence. On the other hand, if t-count < t-table, then there is no significant influence of social capital variables on the adoption of patchouli technology. The results of the significance test of the influence of indicators on the construct and between constructs in the model are shown in Figure 1.

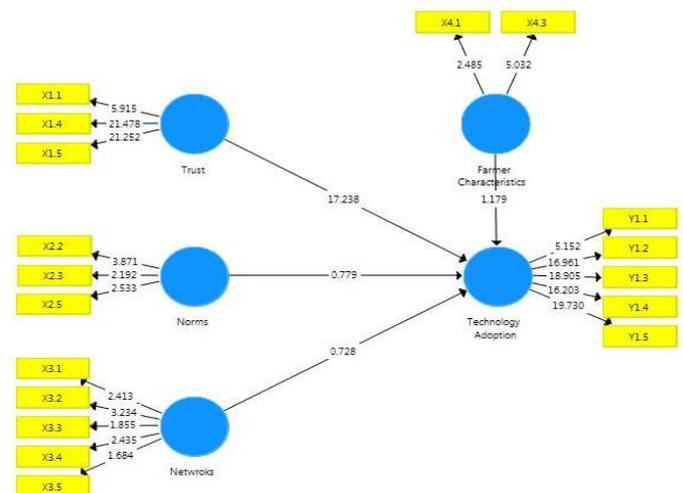


Fig. 1: Model of the significance of the social capital influence on the adoption of patchouli technology in Aceh Jaya Regency

Based on Figure 1, it can be seen that the trust variable directly has a positive and significant influence on technology adoption with a t-count value of 15.967. Meanwhile, other exogenous latent variables, namely social norms, social networks and farmer characteristics have no positive and significant influence on the endogenous latent variables of technology adoption. The t-count value of social norms is 0.811, social network is 0.749 and farmer characteristics is 1.090. In addition to showing the significant influence between latent variables, the result of the PLS SEM bootstrapping model also shows the significance level of the indicator's influence on each latent variable. The higher the value of the t-count indicator, the higher the influence on the latent variable. The summary of the results of the significance test is shown in Table 1.

Hypothesis	T Statistic	P Values	Description
Trust → Technology Adoption	<b>15.967</b>	<b>0.000</b>	<b>Significant</b>
Social Norms → Technology Adoption	0.811	0.418	Not significant
Social Networks → Technology Adoption	0.749	0.454	Not significant
Farmer Characteristics → Technology Adoption	1.090	0.276	Not significant

Table 1: Model Significance Test Results

#### A. The Influence of Trust on Patchouli Technology Adoption

The results of the significance test indicate that hypothesis 1 (H1) is accepted, namely the trust variable has a positive and significant influence on the adoption of patchouli technology. This shows that the trust variable has a significant influence on technology adoption with a t-test result of 15.967 or  $> 1.96$ . This means that if the trust value of patchouli farmers increases, it will increase the adoption of the use of stainless steel boilers. The trust value of 34 respondents patchouli farmers is shown by indicators of trust among farmers, trust in the government and trust in universities.

The indicator of trust variable that has the highest influence is trust in the government (X1.4) because the t-count value is the largest (22.043). Trust in higher education (X1.5) also has a large t-count value of 20.523. Trust among farmers (X1.1) has a t-count value of 5.560. Therefore, it can be said that the three indicators of the trust variable have a positive and significant influence on the latent variable of trust.

The trust of the farmers toward the government is evident from the programs and assistance from the government to improve the quality and production of patchouli oil. The government's role and assistance in supporting farming can increase farmers' trust in the government (Ernanda, 2018). Trust in universities, in this case Syiah Kuala University through ARC, also has a t-count value that is almost as large as the indicator of trust in the government. Patchouli farmers believe in the knowledge and ability of universities to create the latest innovations related to patchouli and patchouli oil. Patchouli farmers' trust in the government and universities has a great influence because farmers have benefited from government and university programs and assistance, especially Syiah Kuala University and Atsiri Research Center SKU. Trust among farmers is reflected in the belief that farmers will be assisted by other farmers if assistance is needed. Sharing information about patchouli among farmers is a routine activity, for example information on the latest patchouli oil price. Farmers believe the information provided by their colleagues because the sources of information in rural areas rely on fellow patchouli farmers.

#### B. The Influence of Social Norms on Patchouli Technology Adoption

The results of the significance test indicate that hypothesis 2 (H2) is rejected, namely the social norm variable has no positive and significant influence on the adoption of patchouli technology. This shows that the social

norm variable has no significant influence on technology adoption

with a t-test result of 0.811 or  $< 1.96$ . The results of the descriptive analysis also show the same thing, namely the social norm category only a small part is in the high category of 8.82%. Most of them are in the low and medium categories of 91.18%.

Patchouli farmers rely on their own abilities in determining how to cultivate and refine patchouli. The rules and knowledge provided are not necessarily followed as recommended, for example from the government and universities. There are patchouli farmers who still use traditional kettles. The compliance of farmers to follow the recommendations is still relatively small. Therefore, social norms have no significant influence on the use of stainless steel kettles. When viewed from the indicators forming the social norm variable, the influential indicators are the willingness to share information (X2.2) with a t-count of 3.915, compliance with cooperatives (X2.3) with a t-count of 2.395 and compliance with universities (X2.5) with a t-count of 2.804. This indicates that farmers have compliance with cooperatives and universities and farmers are also always willing to share information, especially patchouli oil prices with other farmers.

#### C. The Influence of Social Networks on Patchouli Technology Adoption

The results of the significance test show that hypothesis 3 (H3) is rejected, namely the social network variable has no positive and significant influence on the adoption of patchouli technology. This shows that the social network variable has no significant influence on technology adoption with a t-test result of 0.749 or  $< 1.96$ . The social network in this study is formed by indicators of network size (X3.1), participation in the network (X3.2), ease of obtaining assistance (X3.3), relationship with the government (X3.4), relationship with universities (X3.5).

Farmers' knowledge of patchouli makes farmers rely on each other in overcoming problems related to patchouli cultivation and refining. The network that is formed is not based on fixed norms that apply in society and organizations. However, only a network in the daily life of the community among fellow farmers in the countryside. So that social networks are not strong and affect the adoption of stainless steel patchouli technology. Patchouli farmers only focus on patchouli oil cultivation and processing. Farmers who are busy working on farm land do not have a wide network (Ernanda, 2018). Utilization of production equipment, especially distillation boilers, is based on the reach in the farmer's own area. This condition is also

supported by facts on the ground that there are no agricultural extension workers. The role of extension workers can increase farmers' compliance with recommendations given by the government and universities in the use of new technologies. The close relationship between parties who have information on new technology and farmers will increase the willingness and ability of farmers to use new technology. (Nakano et al., 2018). In line with social norms, farmers' adherence to norms and values in the organization will strengthen the social network by itself. Farmers comply with the rules and recommendations of cooperatives, government, and universities, so farmers will participate in every activity organized by these institutions. Likewise with the desire of farmers to share information, farmers will expand the size of their network because they want the information obtained to be known by other farmers. Thus, it can be said that in this study social networks have a relationship in line with social norms. Social norms have no significant influence on the adoption of patchouli technology and in line with that social networks also have no significant influence on the adoption of patchouli technology in Aceh Jaya Regency.

#### *D. The Influence of Farmer Characteristics on Patchouli Technology Adoption*

The characteristics of patchouli farmers who meet the criteria in the model, namely indicators of age (X4.1) and experience (X4.3). The results of the significance test show that hypothesis 4 (H4) is rejected, namely the variable of farmer characteristics has no positive and significant influence on the adoption of patchouli technology. This shows that the variable characteristics of farmers have no significant influence on technology adoption with a t-test result of 1.090 or <1.96. Patchouli farmers use stainless steel patchouli refining kettles based on age and experience. However, based on the desire to get better patchouli oil and the location of the refining boiler in the farmer's area. The closer to the farmer, the more often it will be used because the farmer can save on transportation costs for shipping from the garden or home to the distillery boiler. Therefore, the characteristics of patchouli farmers have no relationship with the adoption of the use of stainless steel boiler technology. Overall, it can be concluded that there is only one exogenous latent variable (trust) that affects the endogenous latent variable (technology adoption). Variables of social norms, social networks, and characteristics of farmers have no significant influence on the adoption of patchouli technology.

## V. CONCLUSION

Trust has a significant influence on technology adoption. The indicator of trust in the government is the indicator of trust with the most influence, then the indicator of trust in universities and trust among farmers. Social norms, social networks and farmer characteristics have no significant influence on innovation adoption. The indicator of willingness to share information has the greatest contribution to social norms. The indicator of participation in the network contributes the most to the social network. The farming experience indicator contributes the most to the characteristics of farmers. The more farmers trust in the

government, universities and fellow farmers, the more farmers adopt the stainless steel patchouli technology in Aceh Jaya Regency.

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