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# THE ROLE OF BUSINESS ACTOR CHARACTERISTICS IN INCREASING AGROTOURISM PROFITS: A MULTI-ANALYSIS APPROACH

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**Abstract**— Agrotourism has a strategic role in increasing farmers' incomes and encouraging regional economic growth. However, its success is highly dependent on various factors, particularly the characteristics of the entrepreneurs managing agricultural tourism destinations. This study aims to identify and analyse the characteristics of business actors that contribute to increased agritourism profits. This study uses a mixed methods approach, to analyse primary and secondary data. Data analysis was conducted using Orange Data Mining software, which allows in-depth exploration through various methods, including univariate regression to identify variables that influence profits, classification using decision trees to understand patterns of perception towards policies, clustering with the K-Means algorithm to group business operators based on certain characteristics, and association analysis to find relationships between factors that influence tourist visits. The results show that several key factors significantly impact agrotourism profits. The presence of homestays, amusement parks, and fauna diversity positively contribute to increased business revenue. Furthermore, business owners' understanding of agrotourism policies also plays a significant role, with those with high expectations for the sector's development tending to better understand applicable policies and better manage their businesses. Clustering results revealed three main groups of business owners based on their understanding of policies and their level of satisfaction with facilities. Meanwhile, association analysis indicated that accessibility and recommendations from previous customers were the primary factors influencing tourist visits

**Keywords**— Agrotourism, Characteristics of Business Actors, Profit, Policy, Clustering, Decision Tree.

## I. INTRODUCTION

Agrotourism plays an important role in supporting the performance of both the agricultural sector and the economy in general. Agrotourism can be seen as a new way to boost community incomes, especially in developing countries [1]. In addition to increasing farmer profits, agrotourism also plays a larger role in promoting the vital role of agriculture to the community [2]. Agrotourism also plays a role in improving the economic performance of communities in Indonesia. The development of agritourism in North Lombok, one of Indonesia's regions, has improved the community's standard of living Agrotourism development in Sumedang, West Java, has also had positive impacts on farming communities, such as increased agricultural innovation and productivity (Amna et al., 2023; Fadhillah & Fahreza, 2023).

However, the success of agrotourism still requires certain characteristics that support its performance. Some factors include product quality, farmer skills and competencies, biodiversity, government involvement, training, collaboration, and location [5]. Other factors, such as supporting stories related to agrotourism destinations and publicity on social media, also play a role in agrotourism success [6]. Other research has focused more on the differences in the characteristics of agrotourism entrepreneurs. Increases in gross sales are influenced by the length of time a business operates, the number of employees, and the size of agricultural land [7]. Businesses' efforts to target new tourists are also a factor in improving agrotourism performance [8]. Research related to the determining factors for the success of agrotourism in Indonesia is relatively limited, so the novelty of this research lies in its approach, which combines business characteristics, policy understanding, and the influence of vegetation diversification on agrotourism profits, which has not previously been widely discussed in research in Indonesia, as seen in Figure 1.

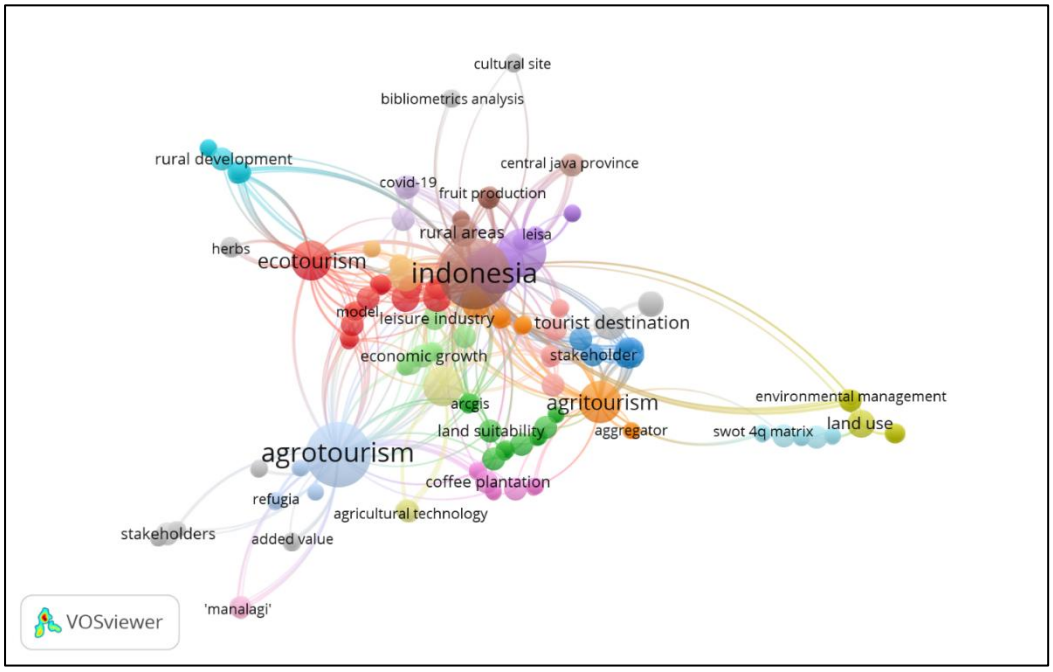


Fig. 1 Vosviewer Analysis of Agrotourism Research in Indonesia

The VOSviewer analysis image shows agrotourism research clusters in Indonesia divided into several color groups. Red focuses on ecotourism and its economic impacts, blue highlights technical aspects of agrotourism, such as agricultural technology and stakeholder engagement, and green examines land suitability and use in agrotourism. Meanwhile, yellow relates to environmental management and sustainability, purple addresses rural areas and fruit production, brown highlights specific regions such as Central Java and cultural sites, and gray reflects research on tourism destinations and stakeholders. This map shows that previous research has primarily focused on the relationship between tourism, the environment, and sustainability, but has not specifically linked vegetation diversification to agrotourism profitability, thus emphasizing the novelty of this research in filling this gap. One study, conducted in a smaller area, such as North Tapanuli Regency, showed that village tourism development efforts are a factor in increasing the sustainability of agrotourism [9]. Other studies have focused more on the positive impacts and important role of agrotourism in Indonesia [10], [11]. Other research discusses proposed forms of agrotourism management, such as community-based agrotourism. The limited agrotourism research in Indonesia also results in limited research that explores agrotourism business actors in greater depth. As a country with a relatively large agricultural contribution to economic output, more research is needed on the determining factors of agrotourism success, including those related to business actors [12], [13].

This study analyzes the determinants of agrotourism success, particularly from the perspective of agrotourism business actors. This study focuses on business actors as the unit of analysis. One of the main objectives of this study is to identify specific characteristics that play a role in determining agrotourism business performance, particularly in terms of financial returns. This study offers an in-depth analytical approach to understanding agrotourism performance by integrating several interrelated key variables. By considering entrepreneur characteristics, such as educational background, experience, innovation capacity, and access to resources, it is possible to determine the extent to which these factors contribute to agrotourism success. Business actors' perceptions of government policies, including extension services, economic incentives, and regulations, are also key components. These differences in perception likely influence their level of adaptation to these policies, which in turn can create disparities in agrotourism performance. Furthermore, the diversity of agrotourism vegetation has a significant but often overlooked influence. Certain vegetation types, such as tropical fruits, herbs, or other high-value commodities, have the potential to attract more tourists, influence economic value added, and determine the business model used. By modeling vegetation type as one of the variables, this study identifies optimal ecological factors to support business performance. The results of this analysis are expected to provide not only theoretical insights but also practical recommendations for business actors to improve the profitability and competitiveness of agrotourism. For example, business actors can be empowered through strategic training based on current policies, the development of vegetation-based product diversification, and strengthening collaboration between farmer groups. Ultimately, this research can serve as an important reference in formulating more sustainable agrotourism policies and management practices.

## II. METHOD

This study employed a mixed methods approach (qualitative and quantitative) utilizing primary data obtained from a direct survey of agrotourism sites in Malang Regency. Research on agrotourism in Malang Regency is highly relevant because the region is known for its agropolitan potential that supports sustainable development, such as orange picking tourism in Selorejo Village. Biodiversity and unique natural tourist attractions create

economic opportunities while preserving the environment. Furthermore, agrotourism in this region has been shown to increase farmer capacity through government support, outreach, and farmer group collaboration, ultimately contributing to sustainable regional economic development.

This study bases its analysis on primary data. Primary data were obtained through direct data collection and information from agrotourism sites in the Malang Raya area. The data collection method was through the distribution of questionnaires conducted during September 2024. The unit of analysis was agrotourism units represented by agrotourism managers. A total of 39 agrotourism units were identified in the Malang Raya area. Primary data collected from 22 agrotourism units. Thus, the response rate was above 50%. Some of the information obtained relates to financial information, agrotourism characteristics, and agrotourism development strategies. The variables analyzed in this study consist of a dependent variable, namely tourism business profits, and independent variables covering various factors such as the number of homestays, amusement parks, fauna, area size, number of foreign tourists, places of worship, photo spots, public transportation, restaurants, shopping centers, and vegetation types.

Data analysis techniques were performed using Orange Data Mining software, which allows visual data exploration and machine learning-based modeling on small data sets. [14]The analysis is also based on a non-parametric approach to accommodate the amount of available data. The analysis process involves non-parametric correlation ranking techniques for factors affecting agrotourism profits, classification to identify tourism managers' preference patterns, clustering to group tourism managers based on certain characteristics, and associative analysis to reveal relationships between variables. The analysis process involves several main methods. The feature ranking method is used to identify factors that influence profits.

The first step was to analyze the obtained data using univariate regression to examine the relationship between each independent variable and profit separately. Furthermore, the RReliefF algorithm was used to determine the level of importance of each variable in influencing profit, taking into account the complex relationships between them. The results of this analysis were then used to rank the variables to identify the factors with the greatest influence on profit.

The linear regression model used in this study can be written in the form of an equation as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + +\beta_n X_n + \varepsilon$$

Where = tourism business profit; = independent variable $YX_1, X_2, X_3, \ldots, X_n$ such as the number of homestays, amusement parks, fauna, area size, number of foreign tourists, places of worship, photo spots, public transportation, restaurants, shopping centers, and vegetation types;$\beta_0$= constant = regression coefficient that shows the influence of each independent variable on profit; = error$\beta_1, \beta_2, \ldots, \beta_n \varepsilon$

Using this model, the study will estimate coefficient values to determine the extent of each factor's influence on profit. Variables with larger, statistically significant coefficient values will be considered more influential in increasing tourism business profits.

$$H(D) = -\sum_{i=1}^{n} p_i \log_2(p_i)$$

Where is the entropy of the dataset. $H(D)$ $Dp_i$Is the probability of the class i, and is the number of classes.n

Furthermore, to group tourism managers based on certain characteristics, the K-Means Clustering algorithm is used.[15], which is defined as:

$$J = \sum_{i=1}^{k} \sum_{j \in C_i} \left\| x_j - \mu_i \right\|^2$$

where is the total variation in the cluster. is the nth data point.$Jx_j$ j. is the centroid of the cluster$\mu_i$ i, and is the number of clusters.k. Finally, to find the relationship between variables in the dataset using Association Rule Mining analysis with Support and Confidence metrics:

$$\text{Support}(A \rightarrow B) = \frac{|A \cap B|}{N}$$

$$\text{Confidence}(A \rightarrow B) = \frac{|A \cap B|}{|A|}$$

where is the total number of transactions. and is the item being observed.NAB

## III.RESULTS AND DISCUSSION

The workflow in this figure illustrates the process of analyzing agritourism data using various exploration and modeling techniques as described in the figure below. The first stage is a non-parametric analysis to determine the factors influencing agritourism profits. The initial data is imported, then relevant columns are selected using Select Columns (3). Next, the data is analyzed using the Rank method, which ranks factors based on their influence on profits.

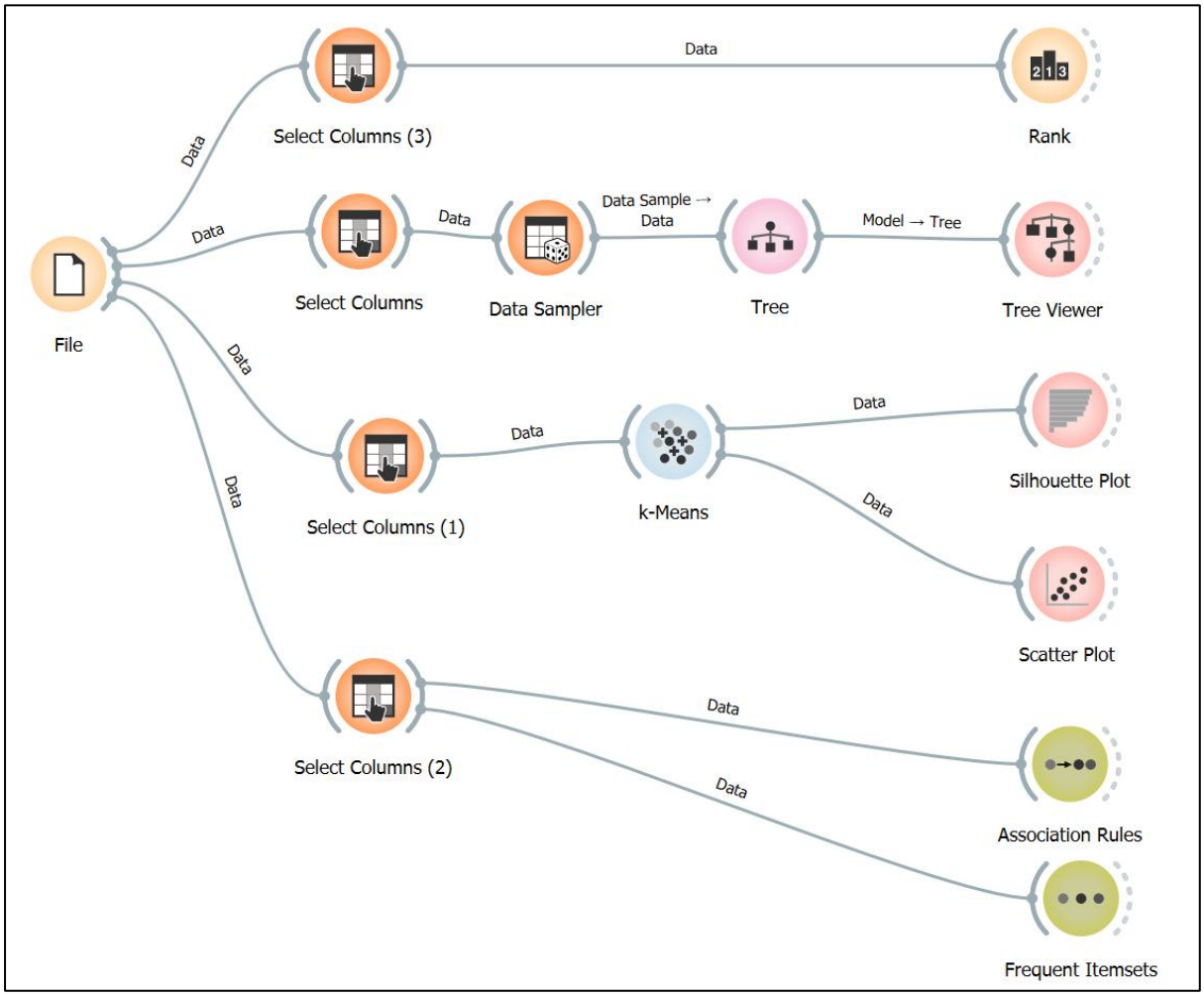


Fig 2: Orange Data Mining Data Processing Workfile

Next, classification was performed using Decision Tree to understand the factors that influence the understanding of agrotourism policy. Data that had been filtered through Select Columns was then divided into specific subsets using Data Sampler. A Decision Tree classification model was then created to analyze the relationship between influential variables, and the results were visualized through Tree Viewer for further interpretation. The next stage was clustering with K-Means, which aims to group tourism managers based on similar characteristics. Data that had been selected through Select Columns (1) was clustered using K-Means, and the clustering results were analyzed using Silhouette Plot to evaluate cluster quality and Scatter Plot to see the distribution of the clustering. Finally, an Association Rule Mining analysis was performed to identify patterns of relationships between variables. The data selected using Select Columns (2) was used to identify association patterns using Association Rules, while Frequent Itemsets helped identify combinations of variables that frequently appear together and have strong relationships. Overall, this workflow provides an in-depth understanding of the factors influencing agrotourism through a ranking, classification, clustering, and relationship analysis approaches between variables.

*A.* Classification with Non-Parametric

**Rank** Thu Mar 06 25, 09:45:16

**Input**

**Features:** HOMESTAY, FAUNA, AMUSEMENT_PARK, PHOTO_SPOT, PUBLIC_VEHICLES, PLACES_WORSHIP, SHOPPING_PLACES, RESTAURANTS, AREA, PERCENTAGE_FOREIGN_TOURISTS, VEGETATION_TYPE (total: 11 features)
**Meta attributes:** AGROTOURISM
**Target:** PROFIT

**Ranks**

| | | # | Univar. reg. | RReliefF |
|---|---|---|---|---|
| 1 | AMUSEMENT_PARK | | 6.022 | 0.339 |
| 2 | FAUNA | | 2.749 | 0.378 |
| 3 | HOMESTAY | | 2.510 | 0.437 |
| 4 | AREA | | 1.505 | 0.249 |
| 5 | PERCENTAGE_FOREIGN_TOURISTS | | 1.274 | 0.221 |
| 6 | PLACES_WORSHIP | | 0.452 | 0.224 |
| 7 | PHOTO_SPOT | | 0.241 | 0.232 |
| 8 | PUBLIC_VEHICLES | | 0.204 | 0.350 |
| 9 | RESTAURANTS | | 0.036 | 0.250 |
| 10 | SHOPPING_PLACES | | 0.025 | 0.250 |
| 11 | VEGETATION_TYPE | | 0.001 | 0.167 |

Fig 3: Univariate Regression Output and Rrelieff

Based on the results of the variable ranking using the Univariate Regression and RReliefF methods with the dependent variable being profit, it can be concluded that some factors have a more significant influence than others. The variable "AMUSEMENT_PARK" shows the highest value in Univariate Regression (6.022), indicating that the existence of amusement parks has the strongest relationship with profit. Meanwhile, in the RReliefF method, the variable "HOMESTAY" obtained the highest score (0.437), indicating that homestays play an important role in influencing profit. In addition, variables such as "FAUNA", "HOMESTAY", and "AREA" also show quite strong influences, so they can be important factors in determining profit. On the other hand, variables such as "VEGETATION_TYPE", "SHOPPING_PLACES", and "RESTAURANTS" have relatively small scores, indicating that their influence on profit tends to be lower. Thus, if the goal of this analysis is to select the best features for a profit prediction model, then variables with high scores such as "AMUSEMENT_PARK", "HOMESTAY", and "FAUNA" can be given top priority, while variables with low scores can be considered to be ignored in the model.

*B.* Classification with Decision Tree

The resulting Decision Tree model has a dependent variable in the form of understanding of agrotourism policy (Likert scale 1-5). Some key information that can be concluded from this decision tree is:

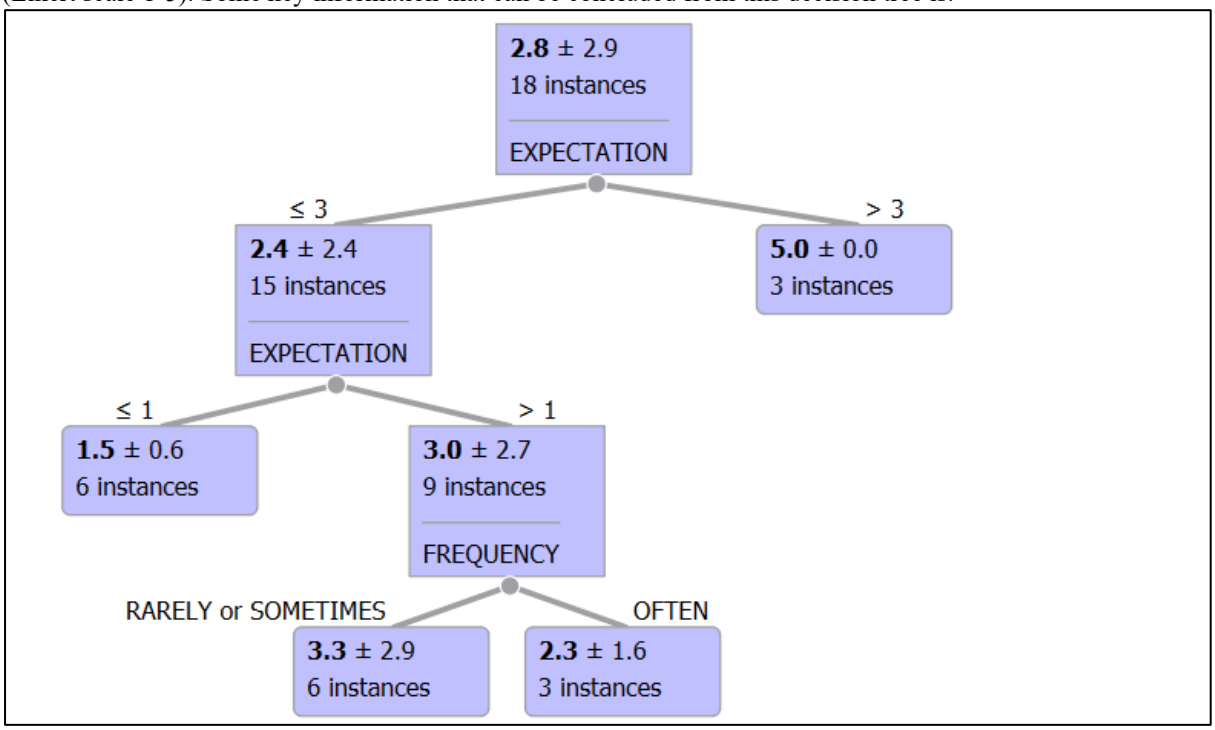


Fig 4: Decision Tree Model

The resulting Decision Tree model shows that the main factor influencing tourism managers' understanding of agrotourism policies is their expectations regarding agrotourism development. Tourism managers with high expectations (Expectation > 3) tend to have a better understanding with an average value of 5.0 ± 0.0, while those with lower expectations (Expectation ≤ 3) have a more varied understanding with an average of 2.4 ± 2.4 (Palit et al., 2017). In addition, the frequency of visits also influences the understanding of tourism managers. Tourism managers who rarely visit agrotourism (Frequency ≤ 1) have a lower level of understanding (1.5 ± 0.6), while those who visit more frequently (Frequency > 1) have a higher understanding (3.0 ± 2.7) [16]
.However, an interesting pattern emerged, where occasional visitors actually had a higher level of understanding (3.3 ± 2.9) than frequent visitors (2.3 ± 1.6). This may be due to the frequent visitors' perceived need for a more in-depth understanding of the policy [17]Based on these results, it can be concluded that to improve tourism managers' understanding of agrotourism policies, more intensive educational efforts are needed, especially for those with low expectations for agrotourism development. Furthermore, agrotourism area development strategies that involve local communities can increase the number of visits by tourism managers and their understanding of existing policies [18].

*C.* Clustering with K-Means

The figure shows the results of applying the K-Means Clustering algorithm to group tourism managers into three main clusters (C1, C2, and C3). Each cluster has distinct characteristics that can be further analyzed based on variables used, such as the age of the tourism manager, the duration of the tourism business's operation, understanding of agrotourism policies, expectations for agrotourism development, and satisfaction with the facilities and services provided.

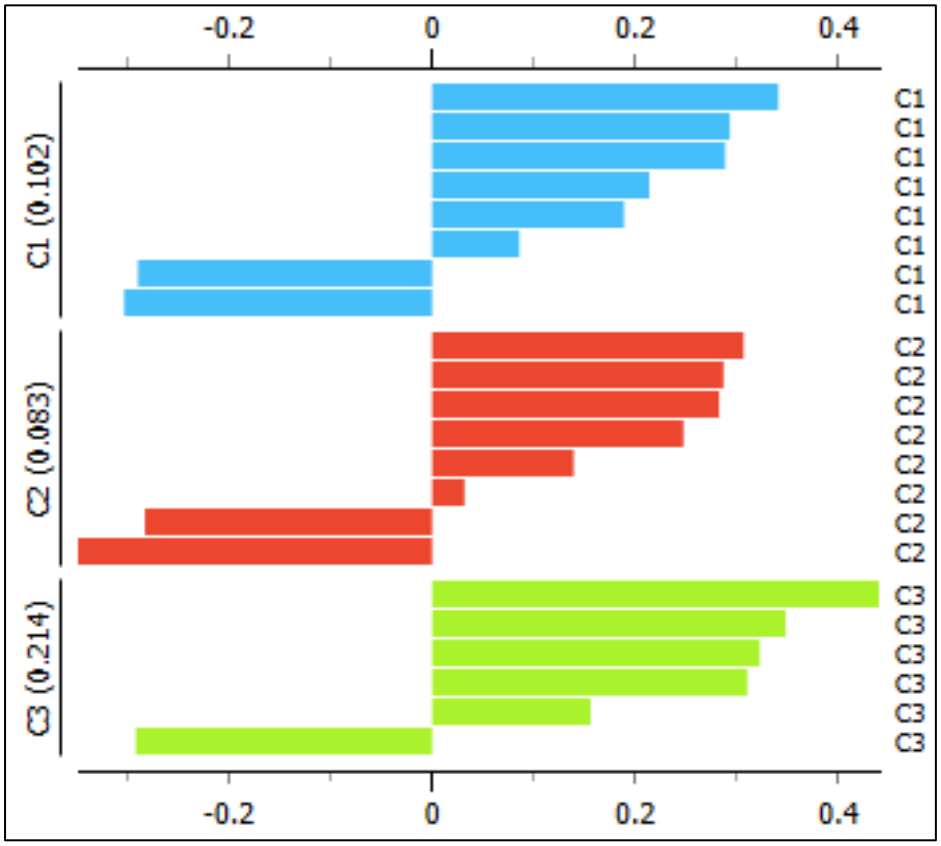


Fig 5: K-Means Based on Three Clustering

The K-Means clustering method was used to group tourism managers based on their characteristic patterns in managing agrotourism destinations. The clustering results provide important insights for stakeholders in agrotourism management to develop marketing strategies and improve services that better suit the preferences of each segment of tourism managers. Aziz (2019) highlighted that segmenting tourism managers based on business operational characteristics can assist in decision-making regarding the development of facilities and policies for agrotourism destinations. Furthermore, research by Nursanti (2023) shows that the level of satisfaction of tourism managers is highly correlated with their expectations for agrotourism development, which is also reflected in the clustering results. These results are also supported by the findings of Palit (2017), who stated that the sustainability of the agrotourism sector is highly dependent on tourism managers' understanding of implemented policies and their expectations regarding available facilities. Therefore, clustering-based segmentation such as this can be the basis for more effective strategic planning to increase the attractiveness of agrotourism destinations.

The figure shows the results of applying the K-Means Clustering algorithm to group agritourism destinations into three main clusters (C1, C2, and C3). Each cluster has distinct characteristics that can be further analyzed based on variables such as the type of experience offered, policy understanding, development expectations, and satisfaction with the facilities and services provided.

1. Cluster 1 (C1 - Blue)

Agrotourism destinations that focus on the experience of picking organic vegetables and fruits. Examples include "DAU" Vegetable Picking Tourism, "Paralagiang" Strawberry Picking Tourism, and "BURING" Organic Vegetable Picking Tourism. These tours tend to attract tourism operators with a strong interest in organic farming and environmental education.

2. Cluster 2 (C2 - Red)

Destinations that offer direct interaction with farms and plantations. Examples include Braw Cow Dairy Agrotourism in Malang, Bedengan Tourism in Malang, and Coban Talun Pine Forest in Tulungrejo. This category appeals to tour operators seeking a more interactive and educational experience about animals and agricultural ecosystems.

3. Cluster 3 (C3 - Green)

Agrotourism based on fruit and other agricultural products, such as apple, orange, and honey picking. Examples include KTMA Apple Picking Tourism in Malang, Folk Agro Apple Picking Tourism in Malang, and Lawang Honey Picking Tourism in Malang. Tour operators visiting these destinations are generally interested in the economic and culinary aspects of agrotourism.

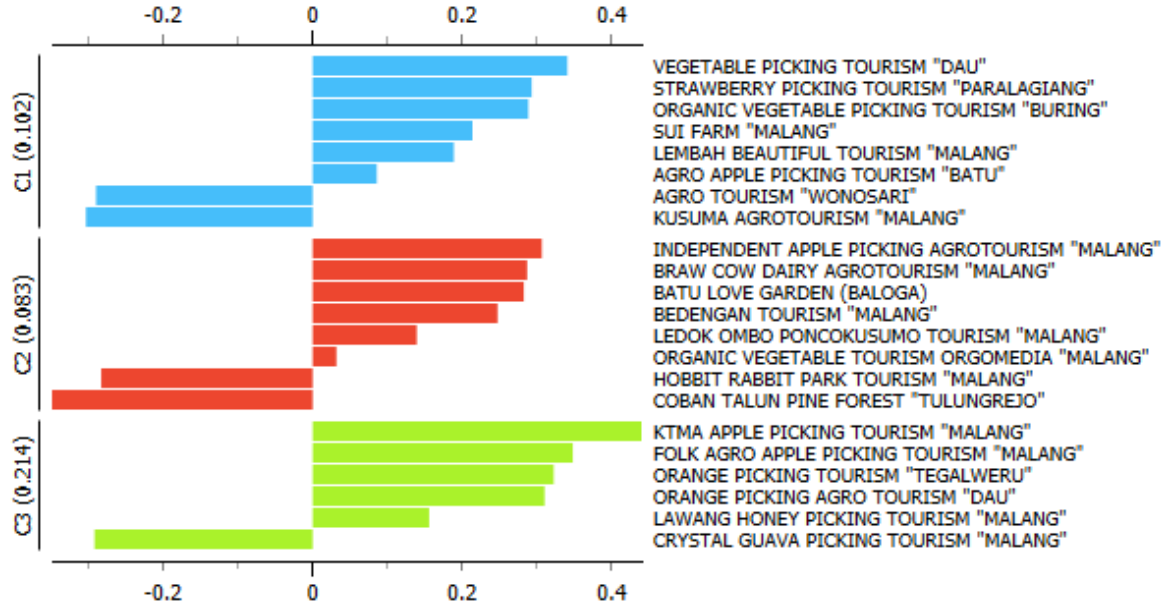


Fig 6: Clustering with K-Means Based on The Name of The Agrotourism

The K-Means Clustering method was used to group tourist destinations based on manager characteristics such as age, operational duration, policy understanding, development expectations, and facility satisfaction. The clustering results indicate three main segments of tourism managers with different preferences for agritourism experiences. Tourism managers in Cluster 1 tend to seek educational and ecological experiences, in line with Muttaqin et al., (2019) research, which states that agricultural education-based tourism is increasingly popular among urban communities. Tourism managers in Cluster 2 are more interested in experiences based on direct interaction with the environment and animals, as explained in Ferreira-Guerrero et al., (2022) research on tourism managers' interest in the concept of ecotourism. Tourism managers in Cluster 3 tend to focus on experiences based on agricultural products and culinary agrotourism, supporting Hung et al., (2023) finding that economic factors and the attractiveness of local products play a significant role in tourism managers' decisions to choose agrotourism destinations.

The use of the Silhouette Score in this analysis helped determine the optimal number of clusters, which in this case resulted in three main groups. By understanding this segmentation of tourism operators, agrotourism managers can adjust marketing strategies, improve service quality, and develop tourism programs that better align with their preferences. The figure above is a scatter plot showing the relationship between the age of tourism managers (AGE) and their understanding of agrotourism policies (POLICY), grouped into three clusters (C1, C2, C3) based on a K-Means analysis. Each point in the scatter plot represents an individual tourism manager grouped based on their shared characteristics.

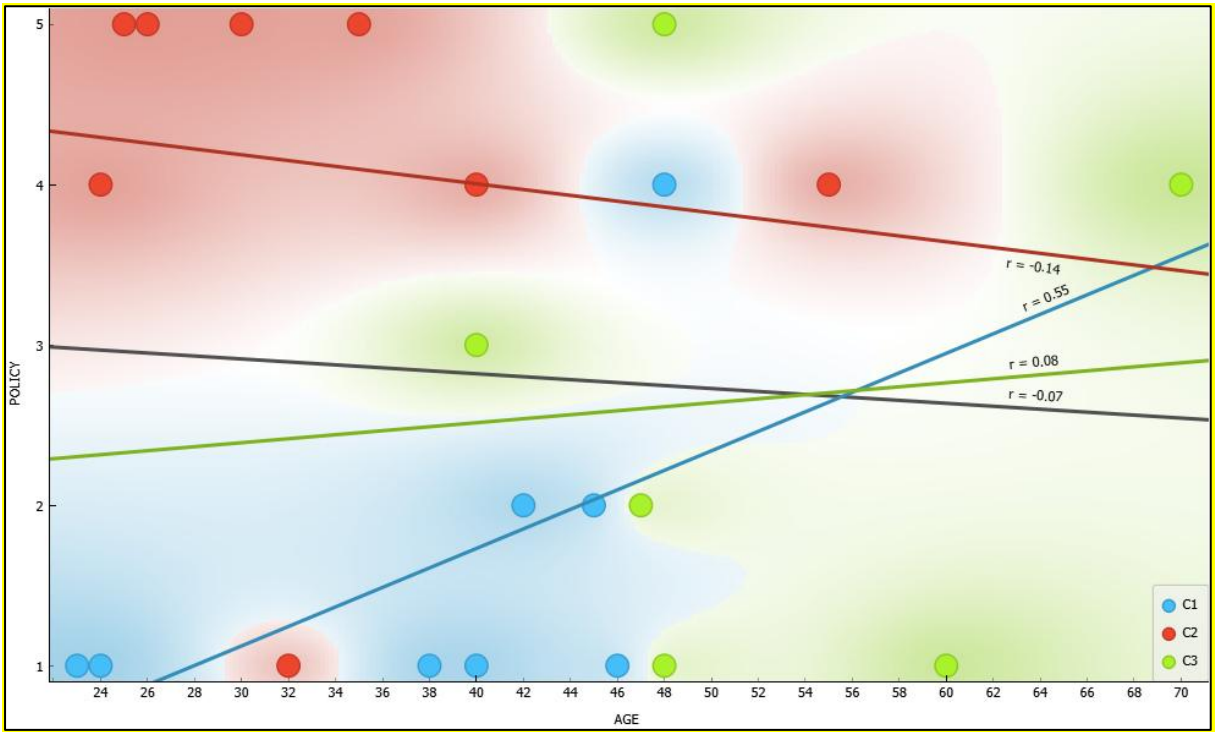


Fig 7: Policy Clustering with K-Means Based on The Age of Agrotourism Managers.

Cluster C1 (blue) consists of tourism managers with low policy understanding, mostly in the 24-45 age range. The correlation between age and policy understanding in this group is quite high (r = 0.55), indicating that younger tourism managers have lower policy understanding, but this increases with age.
Cluster C2 (red) consists of tourism managers with a high level of policy understanding, mostly aged 30-50. However, there is a negative correlation within this group (r = -0.14), indicating that older tourism managers in this group tend to have a slightly lower level of policy understanding.
Cluster C3 (green) includes tourism managers with intermediate policy understanding and a wider age range (38-70 years). The correlation between age and policy understanding in this group is very weak (r = 0.08), thus not showing a clear pattern of relationship.
Tourism managers in Cluster C1, who are predominantly younger, tend to have a lower level of policy understanding. Therefore, a more intensive educational strategy is needed for agrotourism managers to increase their awareness of applicable policies. Tourism managers in Cluster C2, whose policy understanding is higher but tends to decline with age, indicate the need for a more adaptive educational approach to maintain their interest in agrotourism policy aspects. Tourism managers in Cluster C3 have a more varied age distribution and policy understanding. This suggests that besides age, other factors may influence tourism managers' policy understanding. Overall, the results of this scatter plot provide insights that agrotourism managers can utilize to develop more effective communication and education strategies, tailored to the characteristics and segmentation of tourism managers. Utilizing this data can help improve the experience of tourism managers and ensure that agrotourism policies are better understood and implemented. Education-based strategies tailored to the age and level of policy understanding of tourism managers can be an effective approach to sustainable agrotourism management (Aziz, 2019; Nursanti, 2023; Palit, 2017; Sastrayuda, 2010; Syah, 2020).

*D.* Association Analysis with Association Rules

**Association Rules**

Number of rules: 28
Selected rules: 0
Covered examples: 0

Rules

| Supp | Conf | Covr | Strg | Lift | Levr | Antecedent | | Consequent |
|---|---|---|---|---|---|---|---|---|
| 0.091 | 1.000 | 0.091 | 6.500 | 1.692 | 0.037 | FREQUENCY=RARELY, INFLUENCING_VISITS=ACCESSIBILITY | → | EDUC=SENIOR HIGH SCHOOL |
| 0.091 | 1.000 | 0.091 | 2.500 | 4.400 | 0.070 | EDUC=COLLEGE, FREQUENCY=OFTEN | → | INFLUENCING_VISITS=FACILITIES |
| 0.091 | 1.000 | 0.091 | 4.000 | 2.750 | 0.058 | EDUC=COLLEGE, INFLUENCING_VISITS=FACILITIES | → | FREQUENCY=OFTEN |
| 0.091 | 1.000 | 0.091 | 6.500 | 1.692 | 0.037 | FREQUENCY=OFTEN, INFLUENCING_VISITS=PROMOTION | → | EDUC=SENIOR HIGH SCHOOL |
| 0.091 | 1.000 | 0.091 | 4.000 | 2.750 | 0.058 | EDUC=SENIOR HIGH SCHOOL, INFLUENCING_VISITS=PROMOTION | → | FREQUENCY=OFTEN |
| 0.091 | 1.000 | 0.091 | 6.500 | 1.692 | 0.037 | FREQUENCY=SOMETIMES, INFLUENCING_VISITS=RECOMMENDATIONS | → | EDUC=SENIOR HIGH SCHOOL |
| 0.091 | 1.000 | 0.091 | 6.500 | 1.692 | 0.037 | FREQUENCY=OFTEN, SEX=FEMALE | → | EDUC=SENIOR HIGH SCHOOL |
| 0.091 | 1.000 | 0.091 | 8.500 | 1.294 | 0.021 | EDUC=COLLEGE, FREQUENCY=OFTEN | → | SEX=MALE |
| 0.182 | 1.000 | 0.182 | 4.250 | 1.294 | 0.041 | EDUC=SENIOR HIGH SCHOOL, FREQUENCY=SOMETIMES | → | SEX=MALE |
| 0.182 | 1.000 | 0.182 | 4.250 | 1.294 | 0.041 | EDUC=SENIOR HIGH SCHOOL, INFLUENCING_VISITS=ACCESSIBILITY | → | SEX=MALE |
| 0.091 | 1.000 | 0.091 | 8.500 | 1.294 | 0.021 | FREQUENCY=RARELY, INFLUENCING_VISITS=ACCESSIBILITY | → | SEX=MALE |
| 0.091 | 1.000 | 0.091 | 8.500 | 1.294 | 0.021 | EDUC=SENIOR HIGH SCHOOL, FREQUENCY=RARELY, INFLUENCING_VISITS=ACCESSIBILITY | → | SEX=MALE |
| 0.091 | 1.000 | 0.091 | 5.000 | 2.200 | 0.050 | FREQUENCY=RARELY, INFLUENCING_VISITS=ACCESSIBILITY | → | EDUC=SENIOR HIGH SCHOOL, SEX=MALE |
| 0.091 | 1.000 | 0.091 | 6.500 | 1.692 | 0.037 | FREQUENCY=RARELY, INFLUENCING_VISITS=ACCESSIBILITY, SEX=MALE | → | EDUC=SENIOR HIGH SCHOOL |
| 0.091 | 1.000 | 0.091 | 8.500 | 1.294 | 0.021 | FREQUENCY=SOMETIMES, INFLUENCING_VISITS=ACCESSIBILITY | → | SEX=MALE |
| 0.091 | 1.000 | 0.091 | 8.500 | 1.294 | 0.021 | EDUC=COLLEGE, INFLUENCING_VISITS=FACILITIES | → | SEX=MALE |
| 0.091 | 1.000 | 0.091 | 3.500 | 3.143 | 0.062 | FREQUENCY=OFTEN, INFLUENCING_VISITS=FACILITIES, SEX=MALE | → | EDUC=COLLEGE |
| 0.091 | 1.000 | 0.091 | 2.500 | 4.400 | 0.070 | EDUC=COLLEGE, FREQUENCY=OFTEN, SEX=MALE | → | INFLUENCING_VISITS=FACILITIES |
| 0.091 | 1.000 | 0.091 | 4.000 | 2.750 | 0.058 | EDUC=COLLEGE, INFLUENCING_VISITS=FACILITIES, SEX=MALE | → | FREQUENCY=OFTEN |
| 0.091 | 1.000 | 0.091 | 8.500 | 1.294 | 0.021 | EDUC=COLLEGE, FREQUENCY=OFTEN, INFLUENCING_VISITS=FACILITIES | → | SEX=MALE |
| 0.091 | 1.000 | 0.091 | 2.000 | 5.500 | 0.074 | EDUC=COLLEGE, FREQUENCY=OFTEN | → | INFLUENCING_VISITS=FACILITIES, SEX=MALE |
| 0.091 | 1.000 | 0.091 | 3.000 | 3.667 | 0.066 | EDUC=COLLEGE, INFLUENCING_VISITS=FACILITIES | → | FREQUENCY=OFTEN, SEX=MALE |
| 0.136 | 1.000 | 0.136 | 4.333 | 1.692 | 0.056 | INFLUENCING_VISITS=RECOMMENDATIONS, SEX=MALE | → | EDUC=SENIOR HIGH SCHOOL |
| 0.136 | 1.000 | 0.136 | 5.667 | 1.294 | 0.031 | EDUC=SENIOR HIGH SCHOOL, INFLUENCING_VISITS=RECOMMENDATIONS | → | SEX=MALE |
| 0.091 | 1.000 | 0.091 | 8.500 | 1.294 | 0.021 | FREQUENCY=SOMETIMES, INFLUENCING_VISITS=RECOMMENDATIONS | → | SEX=MALE |
| 0.091 | 1.000 | 0.091 | 6.500 | 1.692 | 0.037 | FREQUENCY=SOMETIMES, INFLUENCING_VISITS=RECOMMENDATIONS, SEX=MALE | → | EDUC=SENIOR HIGH SCHOOL |
| 0.091 | 1.000 | 0.091 | 8.500 | 1.294 | 0.021 | EDUC=SENIOR HIGH SCHOOL, FREQUENCY=SOMETIMES, INFLUENCING_VISITS=RECOMMENDATIONS | → | SEX=MALE |
| 0.091 | 1.000 | 0.091 | 5.000 | 2.200 | 0.050 | FREQUENCY=SOMETIMES, INFLUENCING_VISITS=RECOMMENDATIONS | → | EDUC=SENIOR HIGH SCHOOL, SEX=MALE |

Fig 8: Output Association Rules

The results of the association analysis using Association Rule Mining showed 28 association rules linking the variables of education level, frequency of visits to agrotourism, factors influencing visits, and satisfaction with facilities and services. These results revealed that tourism managers with a high school education level were more likely to visit agrotourism sites than other education groups. This is evident from the dominance of rules with the consequence educ = senior high school, indicating that the majority of respondents who frequently visited had a high school education level. Furthermore, the main factors influencing visits were accessibility and facilities, with tourism managers with infrequent visits considering accessibility more in their decisions [21]. The relationship between frequency of visits and gender is also evident in several rules, indicating that males (sex = male) are more likely to have higher visit rates. For example, the rule "EDUC = COLLEGE, FREQUENCY = OFTEN → SEX = MALE" indicates that tourism managers who frequently visit agrotourism sites with a college education level are predominantly male. Furthermore, satisfaction with facilities and services is also closely related to recommendations and available facilities. A rule such as "FREQUENCY=SOMETIMES, INFLUENCING_VISITS=RECOMMENDATIONS → SEX=MALE" indicates that recommendations from others play a role in attracting male tourism managers to agrotourism [22].
These results indicate that in developing agrotourism marketing strategies, accessibility and facilities are key factors that must be considered to increase the number of visits. The high school graduate segment has significant potential as a primary target market because this group is more active in visiting agrotourism sites. To increase manager satisfaction, recommendation-based promotions and the provision of better facilities can increase the attractiveness of agrotourism to male managers. Furthermore, implementing loyalty programs or discounts for repeat visitors can be an effective strategy to increase the frequency of visits. This association analysis provides

valuable insights for agrotourism managers in designing marketing strategies and improving services to more effectively increase visits [23].

Furthermore, Figure 8 shows the results of the frequent itemset analysis, which showed that the majority of tourism managers have a high school education (59.09%), followed by college (31.82%). In addition, males dominate with a percentage of 77.27%, indicating higher involvement in agrotourism management compared to females (22.73%). The frequency of visits varies, with the "often" category reaching 36.36%, while "rarely" and "sometimes" each have 31.82%. Accessibility and facilities factors both have a support level of 22.73%, indicating that both are the main considerations for tourism managers in developing agrotourism destinations. This finding aligns with previous research showing that accessibility and facilities significantly influence tourism management decisions. For example, research by Miranda et al. (2024) found that tourist attractions, accessibility, facilities, and electronic word of mouth collectively significantly influenced the management strategy of Eptilu Agrotourism in Garut Regency. However, partially, accessibility did not significantly influence the management strategy of Eptilu Agrotourism, while tourist attractions, facilities, and electronic word of mouth significantly influenced the agrotourism management strategy [24]

| Itemsets | Support | % |
|---|---|---|
| EDUC=COLLEGE | 7 | 31.82 |
| SEX=MALE | 5 | 22.73 |
| EDUC=SENIOR HIGH SCHOOL | 13 | 59.09 |
| FREQUENCY=OFTEN | 5 | 22.73 |
| SEX=MALE | 10 | 45.45 |
| FREQUENCY=OFTEN | 8 | 36.36 |
| SEX=MALE | 6 | 27.27 |
| FREQUENCY=RARELY | 7 | 31.82 |
| SEX=MALE | 5 | 22.73 |
| FREQUENCY=SOMETIMES | 7 | 31.82 |
| SEX=MALE | 6 | 27.27 |
| INFLUENCING_VISITS=ACCESSIBILITY | 5 | 22.73 |
| SEX=MALE | 5 | 22.73 |
| INFLUENCING_VISITS=FACILITIES | 5 | 22.73 |
| SEX=FEMALE | 5 | 22.73 |
| SEX=MALE | 17 | 77.27 |

Fig 9: Frequent Itemset Output

Furthermore, research by Noble & Sastrawan, (2021) shows that accessibility and tourist attractions have a significant influence on management strategies at Mulyaharja Organic Agro-Edutourism [26]. This research emphasizes the importance of accessibility and tourist attractions in increasing the effectiveness of agro-tourism management. In the context of demographic characteristics, research by Pratama et al. (2024) found a relationship between sociodemographic factors, such as age, gender, education, and income, with agro-edutourism management strategies at Tanikota [27].This research shows that these factors can influence the effectiveness of agro-tourism destination management.

## IV.CONCLUSIONS

This study analyzes the factors influencing the success of agrotourism businesses, focusing on the characteristics of business actors in the Malang Raya area. The results show that several key variables that contribute significantly to increasing agrotourism profits include the presence of amusement parks, homestays, and fauna. Furthermore, business actors' understanding of agrotourism policies also plays a significant role, with business actors with high expectations for the sector's development tending to have a better understanding of policies. The mixed method approach used in this study, through regression analysis, decision tree classification, K-Means clustering, and association analysis, shows that segmenting business actors based on their experience and expectations of agrotourism can be the basis for developing more effective strategies. The clustering results group business actors into three main categories based on their understanding of policies and their level of satisfaction with the facilities provided. Overall, this study emphasizes the importance of improving policy education for agritourism businesses, as well as developing tourism facilities and attractions that align with their preferences. The implications of this research can be used as a basis for formulating more targeted agritourism policies and management strategies to increase the competitiveness and sustainability of this sector in Indonesia.

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