

# Exploratory Analysis of Micro-Small Industries in Village Levels in Papua Province

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**Abstract**—The industry's existence is essential to drive economic development in a region, particularly at the village level, the smallest area where the industry is located. Therefore, it is crucial to determine the factors influencing the micro-small industry (MSI) in the village area. This study involves 759 villages in Papua and analyzes it using the Classification and Regression Tree (CART). The data are taken from a Potential Village Survey conducted by BPS-Statistics Papua in 2018. This study shows that the village with the industrial centre tends to have a higher number of MSI. Simultaneously, the village that does not have an industrial centre and does not have adequate transportation facility tend to have the lowest MSI quantity. The number of MSI will increase in line with the village head's education level and an adequate transportation facility. Based on this finding, three suitable suggestions need to be executed to encourage MSI's growth in each village. First, the government needs to provide the industrial zone to support MSI's existence and development in the village area. Secondly, connectivity between the industrial village needs to be paid attention to by building the road and other support transportation facility. Thirdly, the government needs to provide more assistance for the village heads in managing government and designing policy, especially those who do not have a higher education background.

**Keywords**— village potential, infrastructure, classification and regression tree (CART)

## I. INTRODUCTION

Papua is one of the provinces which has a high dependence on regional imports from other provinces. Statistical report of regional trade released by BPS-Statistics Indonesia shows that the Papua provincial trade balance deficit of two trillion rupiahs [1]. This report also appears that many commodities such as food, electronics, clothing, etcetera, need to be imported from outside Papua.

This fact shows that Papua has a worthiness market share. Local entrepreneurs should respond to it by creating a micro-small industry (MSI) to supply from within Papua. In turn, it will generate economics for Papua itself. Unfortunately, not all villages in Papua have an industrial unit. The result of Village Potential data in 2018 showed that the distribution of MSI in Papua Province only concentrated in several regencies/cities (see table 1), including Merauke, Jayawijaya, Yapen Island, Deiyai, and Jayapura City. Meanwhile, the proportional distribution of MSI in other regencies are less

than 5 per cent. Quantitatively, the total number of villages with MSI is only 759 out of 5,552 villages in Papua.

TABLE 1. FIVE REGENCIES WITH THE MOST NUMBER OF MSI AND THE SPREADING

Regency	Total of MSI	The Number of Villages that Have MSI
Merauke	827	84
Jayawijaya	4,959	80
Yapen Islands	891	47
Deiyai	1,572	44
Jayapura City	798	29

The existence of MSI needs to be encouraged so that its presence will sustain. Various study shows that the existence of MSI is positive to help sustainable economic development [2]. It may occur because MSI can stimulate economic growth in the village area, absorb labour, and empower natural and human resources in the region [3], [4].

It is quite essential to know the various factors that can influence the development of MSI itself. When the exogenous factors are identified, strategic steps can be taken to grow up the existence of MSI. Therefore, this research's main objective is to obtain an overview of MSI distribution in Papua Province and identify the dominant variables that influence it.

As a research limitation, this study focuses only on the village where MSI is located. Meanwhile, the village that did not has an MSI was not analyzed at all. The exogenous variables analyzed include five aspects: financial accessibility, disaster risk, transportation, quality of human resources for village officials, and industrial centres' existence. The five variables are used to measure the effects on the number of MSI in the village.

## II. THEORETICAL REVIEW

### A. Micro-Small Industry as an Economic Driver

MSI is a small-scale factory where the number of workers does not exceed 19 people [5]. As a small-scale economic institution, MSI faces challenges about the limited

accessibility, ranging from access to raw materials, access to capital, and marketing reach [6], [7].

Although the industry scale is relatively small, the role in the economy is quite large [8]. The crises that hit the Indonesian economy in 1998 and 2008 attacked the financial sector [9], but not the small industry's real sector [10]. When Indonesia was faced with a relatively high unemployment rate due to the crisis, micro-business (including the micro-industry) became the support for workers who had been laid off [11]. MSI's existence is a saviour for them not to fall into a long-term poverty line [6].

Referring to various previous studies, researchers such as Abdullah et al. [12] and Rahman [13] agree that MSI needs to get attention from the government [12], [13]. MSI has great potential as an economic buffer. This condition makes the main reason why MSI must be empowered appropriately. Even so, various obstacles are often faced by MSI and must be helped in solving. Mabhungu [14], Samantha [15], Abdullah et al. [12], and Eniola & Entebang [16] reveal that some of these challenges are: access to capital, a sense of security from disasters, adequate infrastructure, and good governance.

In more detail, that four challenges can be interpreted into five approach variables, namely financial accessibility [14], disaster risk [15], transportation [17], quality of human resources of village officials [18], and the existence of industrial centres [19]. According to the results of previous studies, these five variables are quite useful in encouraging the creation of an excellent investment-economic climate to promote the growth and development of micro-small industries in the village area.

### B. The Role of the Village in Development

In his vision, President Joko Widodo stated that the village is the starting point for developers to start [20]. Therefore, in Law Number 6 of 2014, it is stated that the village is the main subject of sustainable development. A village is no longer an object of development that only accepts policies from the central government. Still, the village also has an active role in determining its development, adjusted to the local community's classification and needs [21].

As the smallest territorial unit in the country, the village has its governing authority [22]. The village government has a share in moving the direction of the economy in its territory. Various facts and studies show that quite several independent villages can create an excellent economic climate, such as Sungai Langka Village [23], Temboro Village [24], Sumberpasil Village [25], and Kemadang Village [26].

A village's success in developing its territory cannot be separated from village leaders' managerial ability and the programs launched [27]. Besides, the sense of security in the area and the ease of accessing various resources also affect it. Herman & Falihi [28] and Kehik & Mael [29] stated that the allocation of village budgeting that was right on target as needed was able to make the economy of Paccekke and Usapinonot Villages magnificent. Rahman & Novitasari [30] also stated that the village budget allocation for building various supporting facilities, such as physical infrastructure, has proven to increase the village's economic cycle.

## III. METHODS

### A. Data and Scope

The data used in this study came from a Village Potential Survey in 2018. The total number of villages used was 759 villages with the characteristic that all of these villages had MSI. Meanwhile, the variables used as explanations consist of financial accessibility, disaster risk, transportation, human resources quality for village officials, and industrial centres' existence.

The five variables are obtained based on the conditional combination of several question indicators in the survey. In detail, the classification of each of these variables is as table 2 below.

TABLE 2. DETAILS OF THE VARIABLES

Variables	Classification
Number of MSI (imk)	Ratio
Financial accessibility (kred)	1= Yes 2= No
Disaster risk (kesl)	1= Safe 2= Unsafe
Transportation (trans)	1= Well 2= Middle 3= Bad
Village head education (kades)	1= Not attend the school / Not complete the elementary school / Complete the elementary school 2= Junior High School 3= Senior High School 4= College/University
Industrial centre (sind2)	1= Exist 2= Does not exist

### B. Analysis Method

The method used in this research is the Classification and Regression Tree (CART). This method is used to determine the characteristics that distinguish the amount of MSI in Papua's village. The regression tree can explore the relationship between the two types of variables with the different data types (nominal, ordinal, interval, and ratio) without regard to all forms of assumptions [41].

The difference with the classical regression, the regression tree explains the effect of explanatory variables and the estimation of their responses to the groups of observations determined based on explanatory variables. In that way, the interpretation becomes easier. Furthermore, the regression tree can overcome the problem of data outlier by itself. It contrasts with the classic regression that can not overcome the problem of outlier data [41].

Meanwhile, the software used in this research is R Studio. It has provided a program to analyze data using the regression tree technique, the package tree, which can find in the tool menu, and choose the install packages. There are several steps to conducting an R analysis in this study:

```
>podestree3 <-
  tree::tree(podes2$imk~podes2$kred+podes2$kesl
    +podes2$trans+podes2$kades+podes2$sind2)
> plot (podestree3);text(podestree3)
```

**Note:** podes2 is the name of the data matrix set for this study, and podestree3 is the name of the model.

The more vertices in a regression tree will complicate the tree structure. To overcome these problems pruning trees is needed. In R, tree trimming can do with the prune tree function. The function can show the plot of reducing deviance to the increasing number of vertices [42].

```
> prune <- plot(tree::prune.tree (podestree3))
> plot (prune);text(prune)
```

Fig. 1 shows the development of pruning tree nodes to their deviations. The more tree branches, the less deviance the model produced. Then, the smallest deviance is obtained when node formation is at node 4.

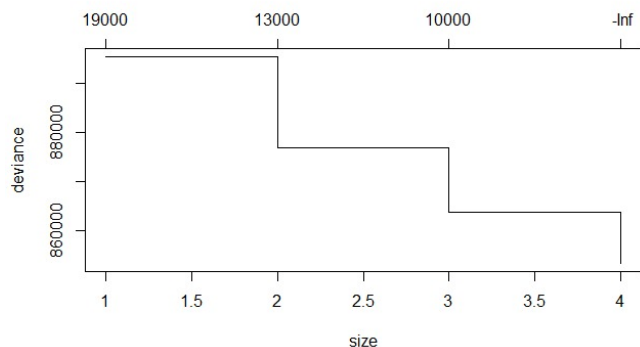


Fig. 1. The Result of Pruning Tree Nodes

#### IV. RESULTS AND DISCUSSION

##### A. Result

Based on the result of the processing from five exogenous variables, it was found that three variables can explain the diversity of the number of MSI in each village. The three variables are the existence of an industrial centre, transportation facilities, and the village head's education level. Meanwhile, the other two variables covering financial accessibility and risk to disasters did not play a role in explaining the varying number of MSI in each village.

From fig. 2, it can be seen that the villages with the least number of MSI are not supported by the existence of industrial centres and are not supported by adequate transportation facilities. On average, the village in this condition only has one MSI. Unlike the village's case with the industrial centre, this village tends to have quite many MSI. On average, villages with this condition have an MSI of around 25 units in each village.

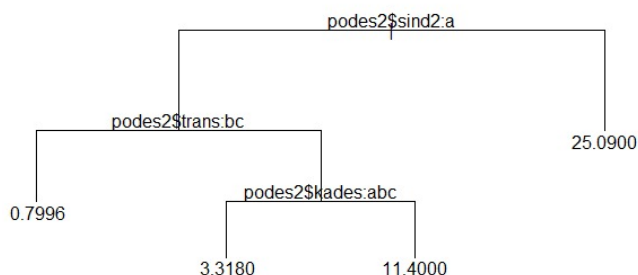


Fig. 2. Regression Result

In Papua, not all the village has the industrial centre. However, the conditions can be improved as long as the village has adequate supporting facilities. The village that has a transportation facility has an average number of MSI of approximately four units (values obtained from the previous

tree regression model by eliminating the village head variable). This condition is getting better when qualified human resources lead the village; in this case, it is reflected in the village head's education level.

The village that does not have an industrial centre but has a transportation facility shall be more optimal when the local village head has a university education background. It is different if the village head has only graduated from primary education (senior high school/equivalent and below). The village led by headship with a higher degree tended to have an average MSI number until 11 units. Meanwhile, the village led by senior high school graduates or below only has three MSI units per village. The village's condition with only primary education for headship is not much different from the village that is not supported by adequate transportation facilities.

In general, from this description, a village category can be compiled based on the number of MSI and local rural conditions, as in table 3 below.

TABLE 3. THE AVERAGE AMOUNT OF MSI FOR EACH VILLAGE AND THEIR PROFILE

The Average Number of MSI	Profile
1	There are no industrial centres and are not supported by adequate transportation facilities.
3	There are no industrial centres, but adequate transportation facilities support them. It is just that the education of the village head is senior high school and below.
11	There is no industrial centre, but it is supported by adequate transportation facilities and is supported by the quality of village heads with a profile of graduates from higher education.
25	Have industrial centres.

From all existing conditions, the village which has the industrial centre is benefited dramatically. Having an industrial centre makes the transportation facility, and the village head's education level does not have a significant effect. In contrast to the village that does not have an industrial centre, the size of MSI number depends on the transportation facility's feasibility and the village head's education level.

##### B. Discussion

###### a) Effects of Industrial Centre

The case in Papua shows that the existence of an industrial centre has an important role. The village which has the industrial centre has more of MSI than the village with no industrial centre. Regarding its role in encouraging the growth and development of MSI, the industrial centre is essential. The various study conducted by the previous researcher with different scope also shows linearity between the existence of industrial centre in driving the economy in the local area [19], [31], [32]. It can be understood that the existence of the industrial centre can encourage industrial units to form a united force to increase business escalation. Besides, this business centre's presence can increase the product's bargaining power against the existing market share. It is different if the village does not have a business centre; MSI shall experience difficulty developing its business and marketing its product. There are currently only 37 villages with industrial centres out of 759 villages (5 per cent) with MSI. This description also indicates that infrastructure

development that can drive business growth and the economic unit is fundamental, including industrial centre. The government needs to carry out the mapping to be implemented concerning industrial centre development plans in the following years.

#### *b) Effect of Transportation*

Even though a village does not have an industrial centre, its performance can be boosted by utilizing transportation. Transportation facility is crucial to connect the various region, from the industrial area, raw material supplier, and distribution. With an adequate transportation facility, the distribution process can run smoothly [33].

The absence of transportation means will hamper economic activity as a whole. In Papua itself, it is evident that the region that does not have industrial centres and is not supported by adequate transportation facilities tends to have only one MSI unit. This finding is also supported by several previous studies such as Gulyani [34] and McKinnon [36], which found that a region without good transportation support tends to experience the constraints on economic growth [34], [35]. Seeing the importance of this transportation facility, the government also needs to increase attention in connecting various regions by building suitable transportation infrastructure. Currently, accessibility to several remote areas is still using air transportation at a high cost. In the future, the government needs to initiate transportation alternatives with the safe land route so that the distribution of goods will run smoothly, and transportation costs can be reduced.

#### *c) Effects of Education*

A policymaker's capability is essential in regulating the socio-economic order in a region, without exception, the village head. It is evident from the differentiation formed in Papua that a village that does not have an industrial centre but has transportation facilities tend to have a higher MSI (if the village head gets a higher education). A significant difference lies in villages with an elementary school education background (no school, elementary school, junior high school, and senior high school) against village heads with tertiary education (get the university's education). This significant difference confirms that a regional leader's educational background, in this case, the village head, is fundamental. Educational background is closely related to a person's ability to manage something and manage the policy [36]. It will encourage pro-welfare policy by sufficient education because the village head well understands his role as the village head [37]. Meanwhile, this ability will decrease if a person does not receive higher education. Therefore, the regency/city and provincial government need to pay attention to implementing policy at the village level. The government needs to monitor, evaluate, and assist village heads who are deemed not compatible. So that development target can be seen from the development of the production business unit can increase.

#### *d) Absence of Disaster Influence*

Meanwhile, related to disaster risk and mitigation in Papua, it turns out that it does not affect the number of MSI in a village. It shows that in Papua, a person's decision to undertake entrepreneurship is not based on disaster risk considerations. This finding is quite interesting because it contradicts previous results, such as Ahsan [38] and Cameron & Shah [39]. Even so, this finding is considered reasonable and not exaggerated, given that Papua itself is a region with

minimal risk of natural disasters. From 1996 to 2018, only a significant tsunami disaster was recorded on Biak Island [40]. Meanwhile, another immense tragedy until 2018 was not encountered at all. The absence of a large enough disaster becomes why the businessman does not consider it as the basis for entrepreneurial decisions to establish MSI.

#### *e) Absence of Influence on Financial Accessibility*

In contrast to the general result study, it turns out that the results of this study indicate that the financial accessibility of a region does not affect the variation in the number of MSI for each village. It explains that when a region has easy access or does not have access to financial institutions, the preference for establishing MSI is not affected at all. The anomaly findings in Papua provide an explanation and further hypotheses that another researcher needs to investigate. Given that MSI is a small-scale industry, the tendency of MSI owners in Papua to use capital sources may come from personal funds or loans from non-financial institutions, such as a loan from relatives and neighbour. It also shows that the financial inclusiveness at MSI is still low.

### V. CONCLUSION

Although MSI's contribution to GDP is not as much as big industry, its role in supporting the lower class's economic sustainability is enormous. Therefore, it is essential to look at the factors influencing the variation in MSI distribution in each village in Papua with conditions in 2018.

From the research results, it is known that the existence of the industrial centre, adequate transportation, and the level of education has the effect of explaining the various numbers of MSI in each village. Meanwhile, the level of natural disaster risk and accessibility to financial services did not affect at all. The village with industrial centres tends to have the most MSI, while villages that do not have the industrial centre and do not have adequate transportation tend to have the least MSI amount. For the village that does not have industrial centres, the number of MSI tends to increase when the region has adequate transportation support and is led by a village head who has a higher education background.

Based on this research, three policy suggestions can be made. First, the government needs to encourage industrial potential to develop by providing the industrial centre facility. Second, the government needs to seriously increase the development of transportation infrastructure to encourage the smooth distribution of goods, which stimulates the growth of MSI in the village. Third, the government needs to assist village heads regarding development-based policy management, so that village heads can play a role in encouraging the emergence of MSI in their region.

Besides, there are several suggestions for further research to complement the results of this study. Referring to the analysis results that have been carried out, further hypotheses need to be explored regarding financial accessibility. A different approach is necessary to measure this variable, namely the capital structure and capital source obtained from the Advanced Economic Census. Furthermore, the insignificance of the disaster mitigation variable also provides a clue to further researcher to use the effect of another similar variable, namely the crime rate of an area.

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