

## Research article

# The Analysis of Characteristics of the Metal Industry As One of the Main Sectors in the Tegal District

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**ORCID**Gilang Rusadi Akhmad: <https://orcid.org/0000-0002-4494-7218>**Abstract.**

The metal industry plays a strategic role in the Tegal District's economy. The BPS data for 2020 showed that the industrial sector had the second-highest job absorption reaching 127,894, after the trade sector. In addition, the manufacturing industry was recorded as one of the most significant contributors to the PRDB of the Tegal District in 2019, reaching 34.60%. Given the importance of the metal industry, a study was needed to reveal the characteristics of the industry in the Tegal District. Thus, this study aimed to determine the current conditions and obstacles faced by metal industry players in the Tegal District. The method used in this research was descriptive quantitative. Data were collected through structured interviews with 33 metal industry players. The results showed that there were 8 metal industries in the underdeveloped, 21 in the developing, and 4 in the advanced categories. Moreover, the key factors and variables in the search have also revealed the weaknesses and strengths of the metal industries in the Tegal District.

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## 1. Introduction

Indonesia is a developing country with one of its economic development agendas focusing on improving people's welfare. According to Rachmawati et al. (2015)[1], a country that wants to accelerate economic growth and development generally takes industrialization. Industrial development (industrialization) is considered one of the activities that can improve the welfare of the people towards a higher quality of life.

Economic development that leads to industrialization can drive economic growth and provide jobs for the population (Gunawan and Saputri, 2018)[2]. Industry can also achieve local economic development through communities utilizing local resources (Iskandar et al., 2016)[3]. Therefore, the development of the industrial sector in the

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regions also needs to get much attention, one of which is the development of Small and Medium Industries (IKM).

Tegal District is one of the regencies in Central Java Province, which has the industrial sector as one of the main economic sectors. The BPS (2020)[4] publication entitled "Gross Regional Domestic Product of Tegal District by Business Field 2015-2019" stated that the processing industry, including the metal industry, has a reasonably significant role in Gross Regional Domestic Product (GRDP). Table 1 shows that the manufacturing sector has a vital role in the GRDP in 2017-2019; although it has experienced ups and downs, it still recorded as the most significant contributor to the GRDP of Tegal District in 2019.

TABLE 1: The Contribution of the Processing Industry to the GRDP in 2017-2019.

Business field / industry	2017	2018	2019
Processing industry	34,69	34,30	34,60

Source : BPS, 2020

The metal industry is one type of processing industry in Tegal District. The metal industry in Tegal District has characteristics that are pretty interesting to study because they are spread relatively evenly in each sub-district. However, the metal industry in Tegal District is mainly in Adiwerna and Talang sub-districts. Through the Ministry of Industry (Kemenperin), the government established a material center (raw material center) in Tegal District in these sub-districts.

Concerning the vital role of the metal industry in contributing to the economy of Tegal District, it is necessary to study the characteristics of the metal industry in Tegal District. This study aims to analyze the characteristics of the metal industry in Tegal District, which has different conditions and characteristics from the metal industry in other regions.

## 2. Research Method

Research on the characteristics of the metal industry was carried out in Adiwerna and Talang sub-districts in Tegal District. The population in this study were all-metal industries in Tegal District. Due to the limited time of the study, it is necessary to take research samples. The purposive sample method was used to obtain information on 33 respondents who owned metal industries in Adiwerna and Talang sub-districts.

This study uses a questionnaire as an instrument to determine the conditions of input, management, and output in the metal industry. The variables in each factor can be described as follows:

1. Inputs include types of raw materials, use of technology, product specialization, and R & D Innovation;
2. Management include sources of knowledge & business skills, human resource development, and networks of cooperation and social capital;
3. Outputs include marketing reach, waste, and product standards.

TABLE 2: Outline of the Characteristics of Metal Industry in Tegal District.

	Input				Management			Output			Total	Category
	A	B	C	D	E	F	G	H	I	J		
Weight												
Industry X												

*Description : A : Type of raw material; B : Use of technology; C : Product specialization; D : R & D innovation; E : Knowledge & business skills; F : HR development; G : Cooperation network and social capital; H : Marketing reach; I : Waste; A : Product standard.*

Table 2 explains that each variable in the input, management, and output factors has different weights. The questionnaire results in nominal data are then given a score, multiplied by a weight, and added together to find out the total overall score.

The scoring rules are based on the availability of factors in each description. If it meets the criteria, it is given a score of 2, and if it is not met, it is given a score of 1. Furthermore, the researcher uses the Sturges method to get a range of values in determining the metal industry into the categories of advanced, developing, and underdeveloped industries.

After each industry has been categorized into advanced, developing, and underdeveloped industries, a map of the characteristics of the metal industry will be made. The metal industry characteristic map was created using QGIS software. It is hoped that the research results can be more easily understood and analyzed with the characteristic map.

### 3. Research Results and Discussion

The research "The Analysis of the Characteristics of the Metal Industry as One of the Main Sectors in Tegal District" was carried out in two sub-districts, namely Adiwerna

and Talang sub-districts. Respondents in this study were 33 metal industry owners spread across the two sub-districts. The distribution of respondents in this study was ten respondents in Adiwerna sub-district and 23 respondents in Talang sub-district.

TABLE 3: Industrial Classification Rating Range.

Industry category	Value range
Underdeveloped	3,0 – 3,8
Developing	3,9 – 4,7
Advance	4,8 – 5,6

Source : Data analysis (2021)

Table 3 explains the ratings used in classifying metal industries. The next discussion will focus more on the geographical, social, and demographic conditions and the findings or the existing conditions of the metal industry in Adiwerna and Talang sub-districts.

**a). Regional Profile and Metal Industry in Adiwerna and Talang Sub-Districts**

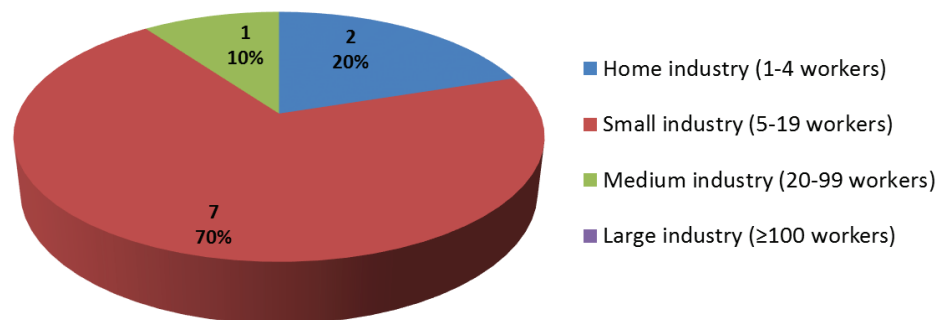


Figure 1: Metal industry group in Adiwerna Sub-District.

As an urban area, the livelihoods of the majority of the population in Adiwerna sub-district are in the trade sector (33.34%) and industry (31.62%). In 2019, the number of workers working in the industrial sector reached 13,373 people out of 42,368 people in the workforce. In more detail, the number of the Metal, Machinery, and Electronics Industry (ILME) group reached 314 industries with the absorption of 1,395 workers (BPS, 2020)[5].

Based on the number of workers, the processing industry can be divided into four categories: home industry, small industry, medium industry, and extensive industry. Figure 1 explains that seven metal industries in Adiwerna District are categorized as small industries, two metal industries are organized as home industries, and only one metal industry is classified as a medium industry.

Meanwhile, Talang sub-district is an urban area with most of the population working in the industrial sector (41.05%) and trade (21.29%). The small and micro business sector

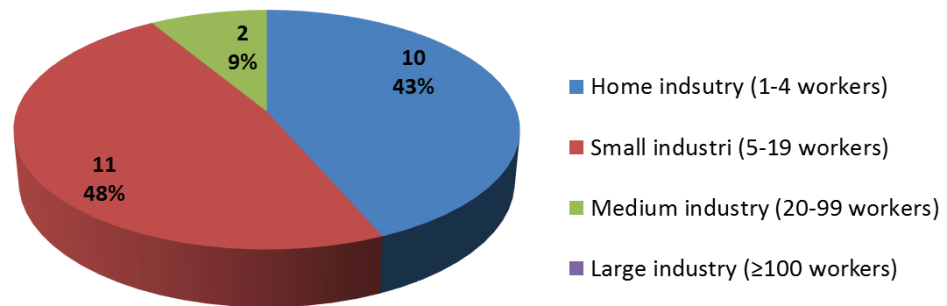


Figure 2: Metal industry group in Talang Sub-District.

of the Metal, Machinery and Electronic Industry (ILME) group in Talang sub-district is 68 industries with 257 people (BPS, 2020)[6].

Figure 2 illustrates that most of the metal industries in Talang District are categorized as home and small industries, with 10 and 11 industries, respectively. There are only two metal industries in Talang District categorized as medium industry and no industry with advanced category.



Figure 3: Some metal industrial products in Tegal District, include: (a) motorcycle tanks, (b) water pump tanks, (c) boat lights, (d) mosque domes.

The findings of the condition of the metal industry are the same as the findings of Bappenas (2004)[7] that, in general, the metal industry in Tegal District is dominated

by small-scale and household industries. Some of these metal industries are managed simply with some weaknesses. According to Sukardi (2011)[8], some of the weaknesses of small industries include independent management, relatively small size, and structural and cultural weakness.

Most of the metal industries in Adiwerna and Talang sub-districts already have product specialities. 9 out of 10 industries in Adiwerna sub-district and 9 out of 12 Talang sub-district have produced specific and specialized products. The products produced by the metal industry in Adiwerna and Talang sub-districts are very diverse, such as automotive spare parts, shipping equipment, water pump tubes, or mosque domes (Figure 3). One common thing commonly encountered is that metal industries located in the same village or metal industrial complex usually have the same product type.

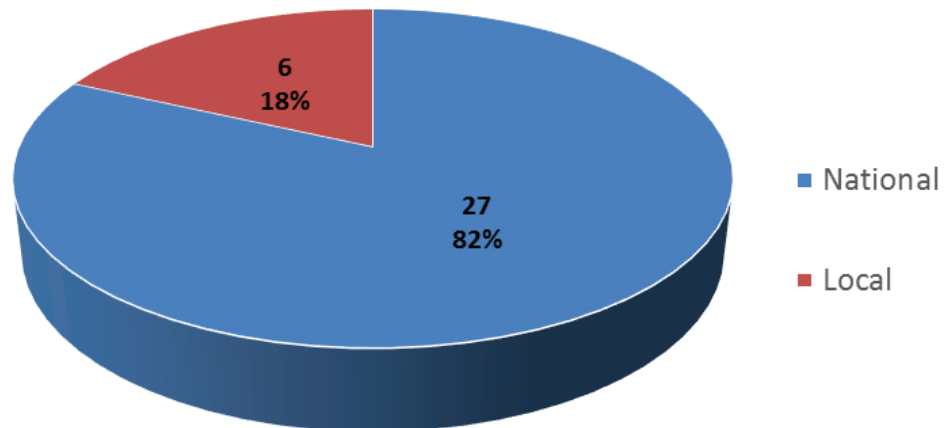
The network of cooperation is a management aspect that has a significant influence on the growth of the metal sector. Cooperation networks can be used to describe the industry’s level of social capital and trust (Bappenas, 2004)[7]. The collaboration network between business and the government, the cooperation network between business and supporting institutions, and the cooperation network between business and supporting institutions are the three types of business connections studied in this study. The findings reveal that in Tegal District, there are several sorts of metal industry cooperation connections (Table 4).

TABLE 4: Types and forms of metal industry cooperation.

Type of Cooperation Relationship	Stakeholders	Form of cooperation
Inter-industry collaboration	Small and medium scale business	Preparation of semi-finished goods
Cooperation between business and government	Industry and Copera-tive Office of Tegal District & UPTD Indus-trial Laboratory / LIK Takaru	Production and ISO training, welding, tax reporting, administra-tive, quality control, exhibition
Business cooperation with supporting institutions	YDBA  PT Hanken Indonesia	Industrial management training and managerial

Source : Data analysis (2021)

One of the essential output factors in the industry is product marketing reach. There are two types of product marketing in the metal industry in Tegal District, namely local (in the Tegal District/City area) and national. Figure 4 shows the marketing reach of 33 metal industries in Tegal District.



**Figure 4:** Marketing reach of the metal industry in Tegal District.

According to Figure 4, 27 metal industries promote their products throughout Indonesia, while only 6 advertise their products locally. Jakarta, Bekasi, Semarang, Surabaya, and other areas throughout Indonesia are areas where industrial metal items are being marketed. Small businesses typically have a straightforward marketing strategy that the owner manages. Meanwhile, because the manufacturing process is complex and requires many workers, marketing is a critical component for medium-sized businesses. Medium-sized enterprises have a more diverse marketing strategy than small businesses, and large businesses use a subcontracting structure.

#### **b). Analysis of the characteristics of the metal industry in Tegal District**

The research "The Analysis of the Characteristics of the Metal Industry as One of the Main Sectors in Tegal District" aims to provide an in-depth analysis of 33 metal industries in Tegal District. Figure 5 shows the distribution and classification of metal industries in Adiwerna sub-district.

In general, the metal industry in Adiwerna sub-district is classified as a home industry or small based on the number of workers and its simple management. In this study, three industries in Adiwerna sub-district were classified into underdeveloped industries, six as developing industries, and only one as an advanced industry.

One metal industry in Adiwerna sub-district classified as an advanced industry is Tiga Saudara Manufaktur, located in Adiwerna Village. This industry is engaged in the automotive sector by providing spare parts and supplies to Astra Motor. This industry is classified as an advanced industry for three reasons:

1. This industry has products specialized in the form of motorcycle spare parts.
2. This industry has a worker that has a higher education background.

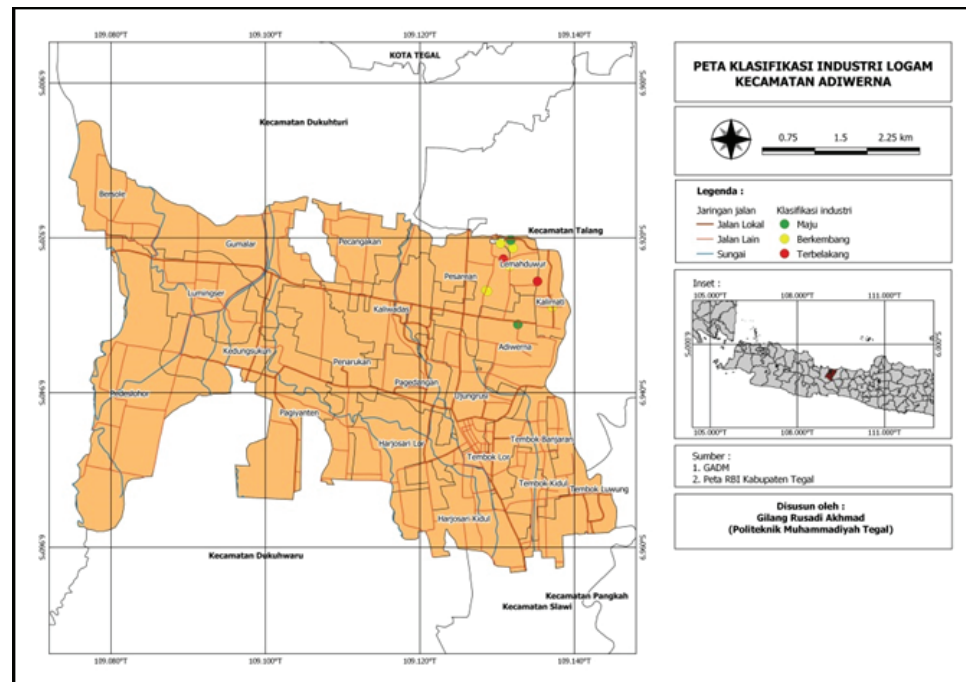


Figure 5: Map of metal industry classification in Adiwarna Sub-District.

3. This industry has a good relationship with the government, supporting institutions, or related industries.

Tiga Saudara Manufaktur is a supplier of motorcycle spare parts for Astra Motor. Astra Motor applies a reasonably high standard in collaborating with related industries. As stated by an industry manager, *“There are quite strict requirements applied by Astra Motor, such as adequate office facilities. However, many facilities can be obtained from Astra Motor in the form of ISO training, tax management, or other administrative matters.”*

Tiga Saudara Manufaktur also has a good relationship with Astra Motor and the Industry and Cooperative Office of Tegal District. As stated by the industry manager, *“We often receive training from the agency, one of which is from LIK Takaru who is the helper of the agency. Production training, welding, Quality Control, there are many more”.*

Figure 6 illustrates the distribution and classification of metal industries in Talang Sub-district. One of the three metal industries that fall into the advanced category is UD. Mirafix. UD. Mirafix is a small-scale metal industry that produces gas stove spare parts. Young people with a Diploma 3 manage the industry. This industry produces and has shops that sell several small and extensive spare parts from gas stoves.



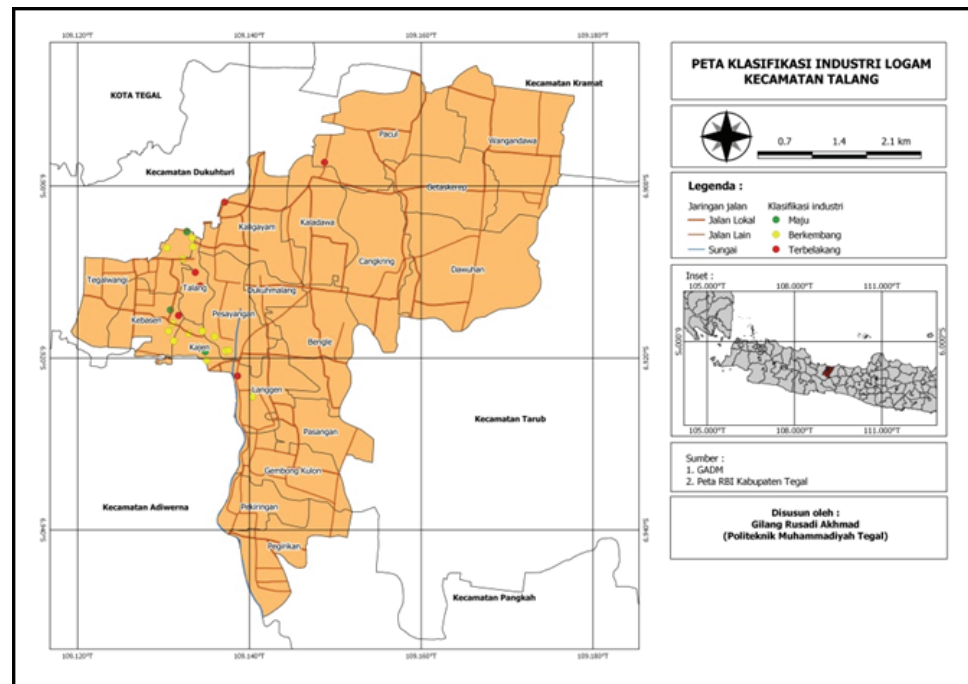


Figure 6: Map of metal industry classification in Talang Sub-District.

There are two reasons UD. Mirafix belongs to the advanced industry category. *First*, UD. Mirafix is the only metal industry that registers its products to obtain IPR. This industry is applying for IPR registration for one of its products, namely a one-burner stove named “Geni Biru”.

*Second*, UD. Mirafix has a perfect relationship with the Industry and Cooperative Office of Tegal District. The industry also often gets training for its workers from the service. According to the manager of this industry, SMEs must have the courage to open lines of communication with related agencies. It is known that the owner of this industry is one of the administrators at LIK Takaru as proof of the existence of social capital and proof of the existence of UD. Mirafix.

#### 4. Conclusion

The metal industry in Tegal District has a vital role in the regional and national economy. The metal industry is one of the most significant contributors to the GRDP of Tegal District and has relatively good absorption of labour. At the national level, the metal industry in Tegal District is proven to support the needs for equipment and components of the national industry. However, most of the metal industries in Tegal District are home and small industries with weak capital and resources, making them vulnerable to

environmental instability. For example, most of the metal industry is not producing due to the scarcity of oxygen gas known as production fuel due to the Covid-19 pandemic.

Most of the metal industry in Tegal District also does not have a relationship with the government or supporting institutions. This collaboration is essential for metal industry owners to add insight into the management and management of metal industry businesses obtained through training programs or workshops. However, small or medium scale industries can only access these programs with solid capital and human resources.

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