



Measuring inefficiency of MSEs in the food processing sector

*Fitrah Sari Islami^a, Sudati Nur Sarfiah^b, Lucia Rita Indrawati^c,
Whinarko Juliprijanto^d, Yustirania Septiani^{e*}*

^a Faculty of Economics, Tidar University, Magelang, Indonesia; fitrahsari@untidar.ac.id

^b Faculty of Economics, Tidar University, Magelang, Indonesia; sudatinur12@gmail.com

^c Faculty of Economics, Tidar University, Magelang, Indonesia; luciaritaindrawati@yahoo.co.id

^d Faculty of Economics, Tidar University, Magelang, Indonesia; whinarko@untidar.ac.id

^e Faculty of Economics, Tidar University, Magelang, Indonesia; yustirania_septiani@untidar.ac.id*

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ABSTRAK

Sektor pengolahan makanan adalah sektor yang memberikan kontribusi konsisten terhadap produk domestik bruto (PDB) industri non-migas, serta sektor yang mampu menghadapi berbagai shock yang terjadi di perekonomian. Bentuk usaha di sektor makanan didominasi oleh UMKM yang menjalankan usaha masih dengan metode konvensional. Karena itu, penelitian ini dilakukan pada berbagai pelaku UMKM untuk memiliki pemahaman yang lebih baik tentang efisiensi UMKM. Makalah ini menggunakan data sekunder dari hasil survei tingkat usaha oleh Dinas perindustrian dan Perdagangan Kota Magelang tahun 2019 dalam kerangka elemen random cross section sebanyak 948 usaha mikro dan 199 usaha kecil untuk mengestimasi faktor penentu inefisiensi UMKM di Indonesia yang dibagi dalam 2 kategori yaitu jenis usaha kecil dan usaha mikro. Hasil penelitian berdasarkan fungsi produksi menunjukkan bahwa modal dan tenaga kerja berpengaruh signifikan terhadap peningkatan efisiensi. Selain itu, hasil penelitian menunjukkan bahwa penyebab rendahnya efisiensi usaha kecil dan mikro adalah karakteristik gender dari pelaku usaha. Untuk usaha mikro, wilayah pemasaran menjadi penyebab inefisiensi, sedangkan lokasi usaha menjadi penyebab inefisiensi usaha kecil.

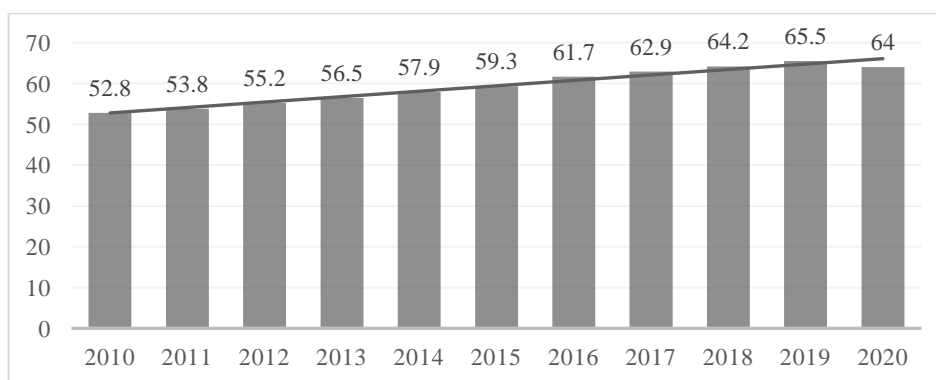
ABSTRACT

The food processing sector is a sector that consistently contributes to gross domestic product (GDP) for the non-Oil and Gas industry and also a sector that can deal with various economic shocks. A business form in this industry is still dominated by Micro and Small Enterprises (MSEs), which run the business traditionally. Therefore, this research is conducted for various MSE actors to understand their efficiency better. This paper uses secondary data from the results of a business-level survey by the Department of Industry and Trade, Magelang City in 2019 within a random cross-

sectional framework of 948 micro-enterprises and 199 small-enterprises for the estimates of the inefficiency determinants of Indonesia MSEs which is divided into 2 categories, namely the type of small-enterprise and micro-enterprise. The results based on the cross-logarithmic production function show that capital and labor significantly impact improving efficiency. In addition, the research results show that the reason for the low efficiency of small enterprises is the gender characteristics of corporate actors. For micro-enterprises, the marketing area is the cause of inefficiency, while the location of the business is the cause of the inefficiency of small enterprises.

INTRODUCTION

Micro, Small, and Medium Enterprises (MSME) are considered the most accessible type of business conducted by economic actors for all entry levels (Ariyani & Cahyadin, 2020). Besides, MSME is one of the economies driven in most developing countries, in terms of the role of MSME in absorbing the workers that will eventually lead to decreased numbers of unemployment (Emmanuel *et al.*, 2020; Noor & Siang, 2014; Sarmah *et al.*, 2021; Selvam, 2021), including Indonesia. Conversely, MSMEs are vibrant and dynamic-type businesses (Qalati *et al.*, 2020). For illustration, when Indonesia dealt with a monetary crisis in 1998, MSME emerged as the savior for the national economy with an output escalation of up to 350 percent at the same time when the big companies should close their business. On the contrary, when the Covid-19 pandemic strikes, this sector suffers the biggest impact. The rapid shift of people's consumption patterns from direct to online makes most MSMEs unable to adapt swiftly. Eventually, it leads to difficulties in continuously running the business, and it is decided to reduce the number of workers, directly causing the workers layoff. The following figure illustrates the development trends of MSMEs in Indonesia from 2010 to 2020.



Source: Badan Pusat Statistik (2016, 2020, 2022); Kementerian Koperasi dan Usaha Kecil dan Menengah (2023), processed data.

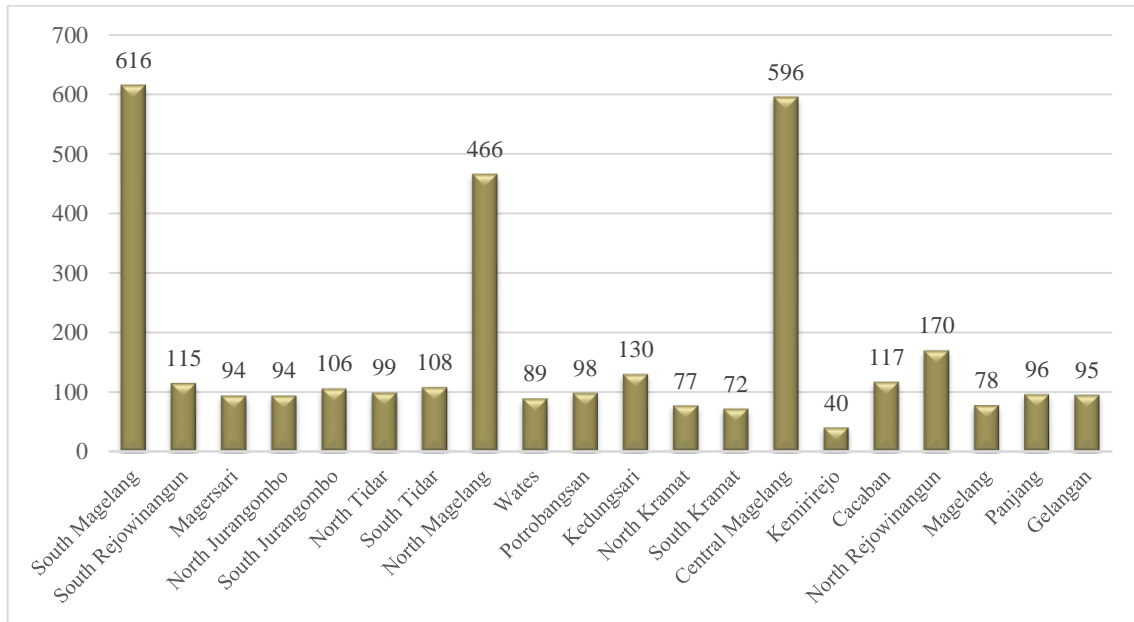
Figure 1
The Development Data of Micro, Small, and Medium Enterprise in Indonesia from 2010 to 2020 (in Millions)

Based on Figure 1, it is revealed that MSMEs development from 2010 to 2020 experiencing fluctuation tends to the improvement. From 2010 to 2019, it recorded a growth of 12,7 million MSMEs. The year-on-year increase is encouraged by the technology advance and easy access. Those factors are identified as the main reasons for MSME's growth in numbers. Active participation of the government is also recognized as another reason for the MSME's growth, in which the government recently provided facilities to the MSMEs' owners or potential MSMEs in the form of training and aid. However, it should also be realized that the increase in MSMEs has two consequences. The positive side will increase MSME capitalism, leading to a rise in the economy. In contrast, the negative side will increase competition between business actors (Anggadwita & Mustafid, 2014).

Nationally, the food and beverage sector dominate the economic sector that MSMEs actors mainly perform. According to the data from the Ministry of Industry, the Republic of Indonesia (Kementerian Perindustrian, 2019), 60 percent of total MSMEs sectors are included in the food and beverage industry. Data also demonstrated that the growth of the national food and beverage industry reached 7.78 percent. This figure is higher than the growth of the oil and gas industry, with 4.34 percent or the growth of the national industry with 5.02 percent. In the same year, the GDP of the non-oil and gas processing industry, and the food and beverage sector share the number of 36.40 percent. It shows that the food and beverage industry play an important role in industrial growth and the national economy.

Towards 2020, the number of MSMEs decreased from 65,5 million to 64 million. The actors suffer revenue loss due to the enactment of public activity restrictions to break the chain of the Covid-19 virus. It makes MSMEs prefer to close the business to lessen the growing expenses imbalanced by the revenue.

As the smallest city in Central Java Province, Magelang City also suffers from decreasing MSMEs number, considering that economic activity in Magelang City is dominated by the informal rather than the formal sector. The distribution of MSME in Magelang City is illustrated in Figure 2.



Source: Department of Industry and Trade of Magelang City (2023), processed data

Figure 2

Profile Data of Micro, Small, and Medium Enterprise (MSME) for Industry per Village in Magelang City Year 2020 (Unit)

From Figure 2, it can be seen that the regency in South Magelang has the highest number of MSMEs compared to other regencies, with 616 units. At the village level, North Rejowinangun leads with 170 units, recorded as the village with the most units of MSMEs compared to others. Of all MSMEs in Magelang City, the food and beverage sector are the biggest sector for the food processing industry.

Yet, managing the business in the food and beverage industry sector is relatively tough. According to Kusuma *et al.* (2019), the MSMEs in Magelang City should settle possible issues. First is the capital or marketing budget due to the lack of initial capital and access to capital designated for MSME's long-term growth investment. Secondly, the supply chain still employs conventional technology for production tools and the characteristics of manual workers. This type of technology leads to a lack of productivity and efficiency in the manufacturing process. Thirdly, the land rent expenses keep rising each year and burden the MSME's actors. Fourth, the poor legality aspect is owned by MSMEs, since they still can be found several MSMEs without legal entities. Fifth, the Magelang City government maintains the existing infrastructure since the MSMEs that the government accommodates with a business location identify the lack of parking lot area and poor finishing of road access.

In brief, the problems MSMEs confront to improve business productivity, specifically in the food and beverage sector, are inefficiently performed. According to Afzal & Ayaz (2013), efficiency is the maximum utilization of input and output productivity. Some types of efficiency, such as expenses, technical, scale, and

allocation, have been explained, identified, and calculated using various techniques. A company can be defined as efficient technically if it uses minimum input to generate specific output numbers. While cost efficiency is explained as the ratio between the accomplishment of a certain production volume with minimum cost and the actual cost. Pilar *et al.* (2018) demonstrated that a company's efficiency lies in the environment, production experiences, and knowledge mastered by the resources or the workers. This human resource capital is seen from the workers' average education, formally or informally, that is transferred from the skillful workers to unskilled ones. Yet, according to the research conducted by Lee *et al.* (2019), innovation efficiency can be judged by single input activity.

The measurement of production efficiency becomes important to serve better performance of work units, in terms of production factor utilization. Two common econometrics methods might be employed to measure government efficiency: the non-parametric and parametric approaches. The most common method used for the non-parametric approach is Data Envelopment Analysis (DEA) which focuses on analyzing variations in the technical efficiency scores of the firms (Erena *et al.*, 2021). Then, the most common method used for the parametric approach is Stochastic Frontier Analysis (SFA). The method of Stochastic Frontier Analysis (SFA) estimates not only the technical efficiency of each policy taker unit but also quantitatively analyzes the impact of factors that cause disparity to technical inefficiency. The value of technical efficiency demonstrates the ability of the company or business unit to attain the likelihood level for the highest output with numbers of input and specific technology (Abdullah *et al.*, 2020; Aigner & Chu, 1968; Charoenrat & Harvie, 2014; Le *et al.*, 2018; Skevas, 2020; Tunggal & Joesron, 2019).

Each production unit's efficiency is created from management's ability to maintain the input balance, input, and expenses. The research conducted by Primatami & Primadhita (2020) explained that many MSMEs still performed inefficiently performance, even though some tend to shift towards better performance. A study by Charoenrat *et al.* (2013) also implied that SMEs and MSMEs have a high technical inefficiency level in the production process. On the other hand, the research conducted by Ramadani & Boedirochminarni (2017) demonstrated the efficient performance of MSMEs that the government coached MSMEs inefficiencies were also found in the informal metal fabrication companies in Zimbabwe, indicating a high level of technical inefficiency in the production process (Makate *et al.*, 2014).

Although most MSMEs have not yet reached the state of efficiency, the role of MSMEs is very important, especially in regional economic development (Panjawa *et al.*, 2022; Prakoso *et al.*, 2021). Therefore, the inconsistency of MSMEs' output products becomes the main problem that will be revealed through this research. This inefficiency indicates the existence of several issues faced by the MSMEs actors, mainly in utilizing several production factors or the selection or employment of human resources during the processing process. It takes comprehensive research to study the

performance of MSMEs from the perspective of output orientation resulting from the input, specifically for MSMEs specializing in food processing. The findings from this research should make an important contribution to entrepreneurship. Therefore, this study makes a major contribution to research on micro and small enterprises' performance by demonstrating of deciding factors of the inefficiency that emerged in the food processing sector of micro and small enterprises. This study aims to contribute to this growing area of research by exploring production input.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

In the current data envelopment analysis (DEA) literature, the evaluation of the inefficiency of decision-making units (DMUs) concerning the possibility of input-specific reductions has piqued interested (Kapelko, 2018). One of the developed methods is the frontier method. The frontier method has been developed from time to time. From the basic production theory, the production function, in the form of linear or transformation, is comprehended as the maximum output achievement over various input combinations. Hence, the transformation function will describe a border or frontier. From here, a relative position of the real production function towards a frontier can be later calculated, which shows the position of efficiency or inefficiency on the production function.

Inefficiency is initiated from the inability of the actors to achieve the goal point, moreover, in the highly dynamic environment. The actors will struggle to determine the allocative decision to remain responsive toward production environment change. The inefficiency measurement is initiated by Aigner & Chu (1968) through the specification of homogenous Cobb-Douglas frontier production that requires the entire observation below the frontier. Although the Cobb-Douglas homogenous assumption has been loosened up by Førsund *et al.* (1980); Forsund & Hjalmarsson (1979), the estimation model is still unreliable in dealing with the possibility of noise caused by deterministic characteristics. Besides, the model is hardly challenging to implement in production activities with more than one input. Altogether, Afriat (1972), continued by Greene (1980); Richmond (1974) formulated the model of inefficiency measurement by using the basic statistical technique to estimate the deterministic statistics frontier. The SFA method has been used extensively in measuring production efficiency. Singh *et al.* (2020) investigated efficiency in Groundnut Farm Households and efficiency in rice farming production conducted by Salam *et al.* (2022). At macro level, SFA and DEA were used to measure the economic efficiency performance in Latin American and Caribbean countries (Koengkan *et al.*, 2022) as well as Campos *et al.* (2022), which apply DEA and SFA to estimate the efficiency of electricity distribution. At present, Amornkitvikai *et al.* (2014); Asmara *et al.* (2016); Charoenrat *et al.* (2013); Dinh *et al.* (2020); Nguyen (2021) as well as Putri *et al.* (2020) used the Cobb-Douglas production function model with the stochastic frontier approach for an

estimate of the performance of a business.

Although the inefficiency measurement has applied the deterministic statistics model, Greene (1980)'s model has not considered the possibilities of external variable influence towards the output. At the same time, Aigner *et al.* (1977), later developed by Schmidt & Lovell (1980) introduced the stochastic frontier model, in which the function is developed by inserting the disturbance term in the model. Here, the efficiency measurement considers not only the allocative side but has also developed on the technical efficiency, which is the productivity measurement on the combination utilization as the production function, as well as to engage the system performance not only the actor's rationality. On the other hand, the first step to estimate inefficiency, the model starts from estimating efficiency.

Based on the Cobb-Douglas production function theory, by the assumption that E is constant at Equation 1 and based on the previous research, then hypotheses that are established for the frontier method or efficiency estimation as follows:

H1: Capital positively affects the efficiency of MSME's performance.

H2: Labor positively affects the efficiency of MSME's performance.

Further, inefficiency can be identified by the residual analysis related to time and the method of input application, the comparison of relative input and system that can be represented by Characteristics and Efficiency over MSMEs Performance (Charoenrat & Harvie, 2014; Ismail, 2012; Musa & Hasan, 2018). In particular, according to Emmanuel *et al.* (2020), there is a positive relationship between the age of the actors and Business performance. It supports the argument that the older a person and the more experiences he has will directly determine the performance of MSMEs, Asmara *et al.* (2016) showed a different result. The actor's age has a negative effect on inefficiency in some location of their research. Based on the characteristics of gender and business location, Selvam (2021) explained that the majority of businesses are situated in urban areas instead of rural areas. Women instead of men, run the majority of ownership of businesses. Charoenrat & Harvie (2014) confirm that location is important firm-specific factors contributing to became efficiency of SMEs' performance. On the other hand, the existence of a correlation between marketing and MSMEs' performance has been explored by Cammayo & Perez (2021); Hoque *et al.* (2017), in which the MSMEs' performance and marketing are concluded as having a positive correlation. Moreover, Mandhachitara & Allapach (2017) indicated that the small business market's scope adjustment and orientation scale is considered beneficial. Market orientation has a direct and positive impact on MSMEs.

Hence, the hypothesis for inefficiency estimation is formulated as follows:

H3: Characteristics difference affects the inefficiency of MSMEs performance.

RESEARCH METHODS

This section explains the data and method to analyze inefficiency by determining the value of technical efficiency (TE) based on the Cobb-Douglas Function and factors that affect technical inefficiency. There were three steps in conducting this research. First, clarification of the definition of a variable. Second, elaborate the Stochastic Frontier Analysis (SFA) Model in detail to analyze the value of technical efficiency (TE), and third modeling the inefficiency.

Hence, by using the specification of the production function, efficiency is formulated as follows:

$$Y = f(X^h, X^p, E) \dots\dots\dots 1$$

In which:

Y = efficiency

X^h = resources from the actors internally (capital and labor)

X^p = aggregation of the entire input

E = cluster of environmental variables

Capital and labor are discovered to influence the outputs explored in several studies about the production function application. Capital and labor positively affect production value (Putri *et al.*, 2020) and income (Yustie & Retnowati, 2020).

This study uses data on the micro and small enterprises obtained from the Department of Industrial and Trade, Magelang City survey in 2019. This research employs the data of micro and small enterprises for the food processing sector in Magelang City. Based on the original data accommodated by the Department of Industrial and Trade, Magelang City, data filtering must be performed since several micro and small enterprises have less information, unclear and incomplete, such as asset and age variables. Besides, the selection of business actors is based on the research's requirement and purpose by measuring the TE value from 948 actors of micro-enterprise and 199 actors of the small enterprise, which the government of Magelang City coaches. The SFA model is based on the business scale, which is the turnover of micro and small enterprises.

This research employs the production factor approach as written in Equation 1, to be applied at the MSMEs in Magelang City as a model for measuring the production output produced by the MSMEs of food processing. Two types of measurements of technical efficiency are identified, which are output-oriented measurement and input-oriented measurement. This research applies the output-oriented measurement and is also recognized as frontier cross-section data since the variables in this research are the input parameter from small industries from all over Magelang City to generate output in food processing products. Later on, based on Equation 1 and following the model of technical efficiency measurement by Battese & Coelli (1993), Equation 2 is formulated as follows:

$$\varepsilon_{it} = U_{it} - V_{it} \dots\dots\dots 2$$

From Equation 2, the stochastic frontier can be written as follows:

$$Y_{it} = f(X_i; \beta) + U_{it} - V_{it} \dots\dots\dots 3$$

Y is described as output, X_i is the actual input vector, and β is the vector of the parameter. Data are transformed into a natural logarithm to mitigate the heteroscedasticity risk to be economically rational since it reflects the differentiated variable growth. The equation for efficiency measurement of MSMEs production in the food processing sector in Magelang City is derived from Equation 1 and formulated as follows:

$$\ln Y_i = \beta_0 + \beta_1 \ln X1_i + \beta_2 \ln X2_i + (v_1 - u_i) \dots\dots\dots 4$$

Y represents output which is described as the natural logarithm of nominal turnover of Micro and Small enterprises, X_1 is defined for capital, which is the natural logarithm for certain numbers of nominal assets of a micro and small enterprise, and X_2 is represented for labor which is the numbers of workers paid by micro and small enterprise, and v_1 is a random variable or random influence, identical and distributed normally. While u_1 is a non-negative random variable that can be assumed to explain the production inefficiency and distributed normally.

Based on this research, the value of technical efficiency (TE) is obtained in 2019 since the study only takes one year. The variables included in the component of technical inefficiency of the SFA model as follows:

$$u_i = \delta_0 + \delta_1 Z1_i + \delta_2 Z2_i + \delta_3 Z3_i + \delta_4 Z4_i \dots\dots\dots 5$$

In which u_1 is described as technical inefficiency Z1 represents the age of the micro and small enterprise, and Z2 represents the gender of the micro and small enterprise owner (1 man and 0 woman). At the same time, Z3 is the business's location labeled with 1 north area, 2 central areas, and 3 south areas. In contrast, Z4 is the dummy variable for the marketing area of micro and small enterprises labeled with 1 for the local marketing area (within Magelang City) and 0 for others.

ANALYSIS AND DISCUSSION

Based on data collected by the Department of Industrial and Trade, Magelang City in 2019, 948 actors of micro-enterprise and 199 actors of the small enterprise are involved in the food processing sector in Magelang City, under the coaching of the government. The technical measurement for efficiency in micro and small enterprises

is carried out using an output-oriented approach. With the approach, the performance of the micro and small enterprises will be determined by their ability to maximize the output using various certain inputs combinations.

This research applies two inputs, which are capital and workers. Capital is a proxy of total assets, while workers are the proxy of the number of workers. Yet, only one output is employed, which is total turnover. Besides, four variables are applied to analyze the cause of inefficiency, including age, gender, business location, and marketing area. The entire variables are illustrated in Table 1.

Table 1 shows the Descriptive-Statistics of variables employed to estimate the SFA. The table demonstrates the average of all output generated by the micro and small enterprise sector in food processing, consecutively with 5.546,95 (thousands of IDR) with a minimum of 100 (thousands of IDR) to a maximum of 25.000 (thousands of IDR) and 53.593,78 (thousands of IDR) with a minimum 25.380 (thousands of IDR) to a maximum of 189.000 (thousands of IDR). Capital is the asset of micro and small enterprises with an average of 7.513,43 (thousands of IDR) ranging between 120 (thousands of IDR) to 2.500.000 (thousands of IDR) for micro-business and an average of 24.613,47 (thousands of IDR) ranged from 900 (thousands of IDR) to 25.000 (thousands of IDR) for small enterprise. The workers are 2 persons on average, ranging from 0-16 persons for micro-business and 5 persons from 1 - 60 persons for small enterprises. The average age for workers hired by micro and small enterprises is 49 years old, ranging from 20 - 75 years old and 24 - 74 years old, consecutively. The actors for micro-business are 23 percent men and 77 percent women, while the small enterprises are run by 65 percent men and 36 percent women. Next, 29 percent of micro-businesses are situated in the North area, 40 percent in the Central area, and 31 percent in the South area. While for small enterprises, 5 percent are located in the North area, 21 percent are in the Central area, and 74 percent are in the South area. For the marketing area, 96 percent of micro-business products are distributed for the local market, and 4 percent are designated for other markets. Then, for small enterprises, the local market is allocated 79 percent and 21 percent to other markets. The marketing area for micro and small enterprises is mostly addressed locally (within Magelang City) instead of others (outside Magelang City).

Table 1
Statistics Descriptive Variable

Enterprise	Variable	Obs	Mean	Std.Dev	Min	Max
Micro	Y	948	5999.49	5546.95	100	25000
	X1	948	7513.42	81428.32	120	2500000
	X2	948	1.84	1.43	0	16
	Z1	948	49.40	10.99	20	75
	Z2	948	0.23	0.42	0	1
	Z3	948	2.01	0.78	1	3
	Z4	948	0.96	0.20	0	1
Small	Y	119	53593.78	30123.15	25380	189000
	X1	119	24613.47	38816.52	900	25000
	X2	119	5.31	6.62	1	60
	Z1	119	49.88	10.58	24	74
	Z2	119	0.64	0.48	0	1
	Z3	119	2.69	0.56	1	3
	Z4	119	0.79	0.41	0	1

Note: Y=Turnover (in thousands of IDR), X1=Asset (in thousands of IDR), X2=Workers (person), Z1=Age (years old), Z2=Gender (1 man and 0 woman), Z3=Business Location (1 north area, 2 central areas, 3 south areas), Z4=Marketing Area (1 local and 0 others).

Table 2
The Estimation Result of the SFA Model

Micro-Enterprise			
Variable	Parameter	Coefficient	t-value
Constant	β_0	7.340	25.06***
Ln(Asset)	β_1	0.163	5.10***
Ln(Labor)	β_2	0.462	7.70***
Log Likelihood Function	-1.1196,2085	LR test	2.29
Small Enterprise			
Variable	Parameter	Coefficient	t-value
Constant	β_0	9.891	23.63***
Ln(Asset)	β_1	0.071	1.88*
Ln(Labor)	β_2	0.171	3.04***
Log Likelihood Function	-61.5557	LR test	0.000

Note: *, **, *** indicate level of significance at 10%, 5% and 1%, respectively

Table 2 illustrates the estimation result of the production model parameter in 2019 of Magelang City using frontier stochastics. The estimation result revealed that parameter estimators on the numbers of inputs at micro-business are significant at the 1 percent significance level, which means that each significant input could explain output. Once the asset of a micro-business actor rises to 10 percent, the turnover will also increase by 16.3 percent. Similarly, when the workers hired by the micro-enterprise actors are added to 10 percent, the turnover will increase by 4.62 percent. Besides, the estimation results of inputs at small enterprises indicate significance at 1 percent and 10 percent. When the asset of small enterprises actor increases to 10 percent, the turnover will rise by 0.705. When the number of workers who work for small enterprises rises to 10 percent, the turnover will hit 1.71 percent. The findings show that assets and labor have a positive impact on the efficiency of SMEs. The answer is consistent with Cobb-Douglas theory and is supported by empirical by Kapelko (2018). These conditions indicate that using assets and labor following the

scale of production in micro and small businesses in the food processing industry will increase the efficiency of the output produced.

In addition to looking at the efficiency conditions for inputs that produce outputs, Table 3 shows the coefficients of inefficiency conditions caused by technical inefficiency. The output of the food processing industry that has not been maximized could be due to technical inefficiency. Several factors that are thought to affect the inefficiency of productivity are caused by a lack of capital, both in number and in sources, a lack of managerial ability, and operating skills in organizing and limited marketing (Suci, 2017). To find out some of the constraints that cause the production output to be not optimal in the food processing industry in Magelang, it can be analyzed based on the results of the following inefficiency calculations.

Table 3
Determinants of Inefficiency in food processing Micro and Small Enterprise in Magelang City

Micro-Enterprise			
Variable	Parameter	Coefficient	t-value
Constant	δ_0	9.059	70.41***
Age	δ_1	-0.001	-1.00
Gender	δ_2	0.240	9.21***
Location	δ_3	-0.012	-0.86
Market Area	δ_4	-0.210	-3.75***
Small Enterprise			
Variable	Parameter	Coefficient	t-value
Constant	δ_0	10.958	53.31***
Age	δ_1	0.001	1.13
Gender	δ_2	0.070	2.06**
Location	δ_3	-0.096	-3.36***
Market Area	δ_4	-0.052	-1.36

Note: *, **, *** indicate level of significance at 10%, 5% and 1%, respectively

The age of actor enterprises has no significant for micro and small enterprises (see Table 3). The age of business actors is unlikely to impact inefficiency in food processing micro and small enterprises in Magelang City. Turnover obtained by the actors in micro and small enterprises is not dependent on their age. It can be initiated at any productive age. Several options are available for micro and small businesses for unnecessarily starting the business from scratch. Currently, the business could be started with a Franchise system. The findings of this study differ from those of Asmara *et al.* (2016); Emmanuel *et al.* (2020).

Based on Table 3, it is indicated that several variables of technical inefficiency demonstrate significance, such as gender and marketing for micro-enterprises and business location for small enterprises. Gender of micro-enterprise actors is positively significant at the significance level of 1 percent. Whereas for small enterprises, it is positively significant at the 5 percent significant level. These results suggested that the gender of micro and small enterprise actors determined the technical inefficiency. For micro-enterprises, men provide a real effect of inefficiency towards turnover, higher 0.240 than women. For small enterprises, men provide a real effect of inefficiency

towards turnover, higher 0.070 than women. It is also notified that the cause of inefficiency in micro enterprises is bigger than small enterprises, in terms of men's gender.

Women share less impact on inefficiency in food processing type of industry for micro and small enterprises in Magelang City, 2019 if compared to men. The impact is recorded as bigger in the small enterprise compared to micro-enterprises, in terms of gender coefficient. Lin (2005) asserts that the social network source approach and the social network structure approach are the two ways mentioned in the Theory of Social Capital when discussing the gender inequalities between men and women. The approach of social network structure consists of strong and weak work bonds. Strong work bonds refer to men while weak work bonds refer to women. In this approach, the women are considered as fragile in establishing a business, open the network, and poor in strategies. Therefore, the women tend to initiate the micro and small enterprises due to ability limitation in expanding the networks and strategies.

Women prefer the micro-business due to gender inequality in the workers' market, time flexibility, and economic opportunities in business (Ismail, 2012). The gender inequality in the social and economic network is reflected in the business results. As the result, most women have roles in micro business, due to the assumption towards women, who are originated with poor networks and low paid. Since this assumption is widely accepted in society, it gives effects to the business result established by Kim & Sherraden (2014). Therefore, women's participation in micro-enterprises increases significantly, either in cities or villages. Women prefer this type of business due to the employment of less capital (Tundui & Tundui, 2012). The reasons are listed as having less capital, absence of entrepreneurship skills, and the opportunity to have advanced business experience, which are the options for women to establish micro-enterprise (Nainggolan, 2016). In addition, women have more interest in the fields of education, business/entrepreneurial knowledge and involvement in a technology-based start-up that encourages women to be more efficient at work (Yusuf, 2015).

The business location also plays its part to determine the technical inefficiency influence for small enterprises. The business location has significant influence at 1 percent significance level. The South area has a bigger inefficiency influence than the Central and North area. Likewise, the business location in the Central area has a bigger technical inefficiency than the North area. At the micro, asset improvement gives a bigger impact rather than asset improvement at small enterprises. As the workers' input, micro-enterprises will encourage bigger turnover than the small enterprises. It considers as a good sign for micro-enterprises for evolving to become small enterprises. Small enterprises could optimize the combination of certain production inputs to enhance or maximize the business turnover.

Although it doesn't appear to have a substantial impact on performance

efficiency, business location also influences how well small businesses perform in Magelang. The location selection should be seriously considered by small enterprise actors. The process of choosing a location for a business is known as location selection, but it should also take local growth into account because the presence of a firm may ensure its long-term viability. The selection has to consider certain aspects that potentially can boost up the sales and provide benefits to a business. The process of selection is influenced by several factors, such as accessibility, visibility, expansion, environment, competition, resources, and government regulation. In terms of how they are implemented in relation to one another, the factors vary depending on the goods and services. Those factors should be considered and captured by the business actors in Magelang City. The results are in line with Charoenrat & Harvie (2014) who also found results that location is important firm-specific factors contributing to the technical efficiency of SMEs. Specific policies are warranted to improve SMEs.

Micro-enterprises marketing area plays important role in escalating the turnover. In Table 3, it is described that the marketing area is negative significant. The local marketing area has the inefficiency effect for -0.210. The local marketing areas have greater inefficiencies than other areas and contribute less to turnover. It suggests that the effect of the inefficiency of micro-enterprises caused by the marketing area is relatively small due to its local coverage area within Magelang City. The marketing area should be also highlighted, specifically for micro-enterprises. An extensive marketing area can push the performance of micro-enterprises to be more efficient. The opportunity and challenge should be captured by the business actors to expand the business. It also takes the marketing strategy for micro and small enterprises. The marketing strategy is crucial because it is defined as the ongoing plan development that aims to satisfy future customers' expectations regarding price setting, advertising, and the distribution of goods and services, from producers to consumers. Surely, the right strategies are required for micro and small enterprises in food processing. Technically, estimation for frontier model and inefficiency equation is stated as a robust model due to the absence of multicollinearity between x and z model applied in the model.

CONCLUSION, LIMITATIONS AND SUGGESTIONS

The study aims to analyzing the inefficiency determinants at the food processing MSME in Magelang City, which first step was examining the level of efficiency based on Cobb-Douglas Function and then using the result from efficiency parameter (frontier method) to modelling inefficiency. The data used in this study were obtained from the Department of Industry and Trade in 2019 and include 948 business actors of micro-firms and 119 business actors of small enterprises receiving government coaching. Based on the result from the function of trans-log production, it is shown that capital and workers give significant influence to improve the efficiency

of business actors in micro and small enterprises. The outcomes also point to a contributing factor to inefficiency, namely the gender-based traits of business actors. While the business location is the reason for efficiency for small businesses, the marketing area becomes the reason for inefficiency for micro-enterprises. The variable of age is insignificant to inefficiency, which shows the older business actors are still productive in performing works. Due to practical constraints, this paper cannot provide a comprehensive review of whole of sectoral micro and small enterprises. The research does not engage with deciding intern and external factor of micro and small enterprises. Therefore, it needs to learn deeper about dependency ratio for older business actors. These findings underline that food processing micro and small firms still need to make more efforts to boost their level of efficiency from the standpoint of policy implications, particularly to highlight the determinants that could increase the company's efficiency. Further research could include input variables to explore more about the causes of inefficiency in micro and small enterprises.

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