SME COMPETITIVENESS CLUSTER ANALYSIS IN EAST JAVA

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Abstract: This study aims to analyse the competitiveness of the small and medium industries in East Java in the face of global economic openness. The method used is a cluster to find out the factors that influence the competitiveness of Small and Medium Industries (SME) by grouping them into groups based on similarity of characters. The use of the cluster method is carried out hierarchically, or processed through a series of successively fusing objects into groups. Based on the results of identification and analysis, then the conclusion, there are three cluster findings based on competitiveness categories. Cluster I is SME with low competitiveness, Cluster II is SME with high competitiveness, and Cluster III is SME with medium competitiveness. SME that have high competitiveness are SME that can increase efficiency in 2 fields, namely Production and Marketing. While SME that have medium competitiveness are SME that are superior in technology, so they can be classified in the creative industry.

Keywords: Competitiveness, Cluster, SME, East Java

JEL Classification: O0; O1; O2; L6

Introduction

The industrial sector is one of the main components of East Java's economy. The average contribution of the industrial sector reaches 29% of the total East Java RGDP in the period of 2012 to 2016. Other sectors that are supporting are the trade and agriculture sectors with an average contribution of 19% and 15% respectively. In the industrial sector, the sub-sector known to be the main contributor is the food and beverage industry sub-sector. While other industrial sub-sectors whose contribution is not too large are tobacco processing and chemical sub-sectors. In general, industries in East Java classified into two, namely Large Industries (LIs), and Small and
Medium Enterprises (SME). This division based on business scale factors, number of workers, investment value, and production technology. In practice, both LIs and SME are both supporting the economy of East Java. However, both of them have different market shares. Ideally, both of them can work together, progress, be strong and have high competitiveness along with the openness of the local, regional and global economy (Disperindag Jatim, 2017).

The number of business actors in the industrial sector in East Java as of 2016 is 813,140 business units. From these, 99.86% is SME while the other 0.14% is LIs. Although the number of SME is very large and to be the backbone of any economy. Their contribution to innovation-led economic growth and job creation has been of renewed interest in recent years, its growth from 2014 to 2016 tends to decline. This is an early indication of the lethargy faced by the SME. Unlike the case with LIs, whose growth increased in 2015, although it declined in 2016 (Disperindag Jatim, 2017).

Viewed from the amount of production, LIs is able to contribute large quantities of production even though the number of LIs is far smaller than the number of SME. Within a year, the average LIs is able to contribute 39.48% of the total production value in the industrial sector. While the average SME production value reached 60.53%. However, both the SME and Lis have a slowdown in production growth. Moreover, in LIs, the growth has declined dramatically from 2014 to 2016. This indicates difficulties for both the SME and LIs in penetrating market share. In other words, both LIs and SME face the problem of decreasing competitiveness. This problem is important, to be solved immediately given the industrial position in East Java, which is to be a contributor to GDP. Both of SME and LIs need to be able to maintain their existence in penetrating local and international market shares.

Some literatures shown, how interesting to analyse about SME, particularly to face a global economy. Vargas and Rangel (2007) observed that business performance is positively related with the development of internal capabilities such as “soft technology” (methods and processes that support the firm) and “hard technology” (externally acquired equipment, in-house development of machinery and innovation in raw materials). A strategy of continuous innovation, innovation and change is also part of the process. In other hand, Singh et al. (2006) developed a Competitiveness Index Framework for quantifying the level of competitiveness. In this context, the present study analyzes different challenges for SME, pinpoints their status, describes the promotional policies related to SME and reviews strategy development in China and India. 

Major constraints in the competitiveness of SME are access to adequate technologies (Gunasekaran et al., 2001), excessive costs of product development projects (Chorda et al., 2002), a lack of effective selling techniques and limited market research (Hashim and Wafa, 2002). Hussain et al. (2006) observed that with the exception of a few top-performing businesses, the majority of SME in China do not possess sufficient self-accumulated capital to meet their capital requirements. As such, it appears that a finance gap exists for Chinese SME, which limits or constrains their potential for growth. Otherwise Ernst and Young (2006) identified additional challenges that include weak intellectual property protection, which makes capitalizing on innovation difficult (Berrell and Wrathall, 2007).
However this study quite different with previous study. Because the method used is a cluster to find out the factors that influence the competitiveness of Small and Medium Enterprises (SME) by grouping them into groups based on similarity of characters. The use of the cluster method is carried out hierarchically, or processed through a series of successively fusing objects into groups. This study wants to reveal the extent of the competitiveness of the East Java SME currently in controlling the domestic market and examine the factors that influence the expansion of the East Java SME market share.

**Theoretical Framework**

The existing literature on SME competitiveness primarily focuses on identifying the factors that are relevant to SME competitiveness and the determinants of its success. It emphasizes on the role of innovation as a key element of competitiveness and it mainly focuses at a country level. Karaev et al. (2007) examine the use of a cluster approach among SME as a tool for meeting their challenges related to globalization and trade liberalization, as well as investigating its contributing factor in the process of increasing their competitiveness. They practically perform a literature review of the existing publications at the time. They find that there is strong evidence to suggest that a cluster policy brings additional positive effect to existing SME policy in industrialized economies, but such effects have not been extensively researched in developing (transition) countries, particularly from the point of view of the SME, which are the main actors in the cluster development process, in relation to whether their performance has been improved as a result of cluster effects.

Munir et al. (2011) look at the sustainability of the competitive advantage of SME by studying the capabilities that they need to develop in order to achieve it. They use a sample of successful SME in leather, sports and surgical instruments clusters. They use field research to interview SME executives of successful manufacturing firms that are in business for a minimum of 15 to 20 years, in and around Sialkot, Pakistan.

Piatkowski (2012) identifies factors that have a direct impact on the competitive position and the development of enterprises. In the analysis performed, a secondary research was employed, using the study of literature, research reports from various scientific centers and statistical data, as well as an empirical re-search conducted by means of a questionnaire with participation on a random sample of micro, small and medium enterprise located within southern and south-eastern Poland.

Utami and Lantu (2014) aim at developing a model of competitiveness for SME, especially in the creative industry in Bandung, Indonesia. As a means to address the issue, they use depth interviews using semi-structured interviews. They rely on the output of the analysis to make recommendations to some of the interest-ed parties, such as the business owners, the government, and the mediator in order to develop the SME.
Sener et al. (2014) present the current state of SME in Turkey and investigate the global competitiveness strategies for them. The results of the study show that SME form 99.9% of the industry in Turkey however only 55% of the SME are operating in value-adding sectors. They need dedicated financial support programs and policy initiatives for increasing their levels of global competitiveness. They look at the structure of the SME in Turkey compared to the European Union with regards to a series of drivers: entrepreneurial learning and women’s entrepreneurship, bankruptcy and second chance for SME, regulatory frame-work for SME policy making, operational environment for SME, support services for SME and start-ups, public procurement, access to finance for SME, standards and technical regulations, enterprise skills, innovation policy for SME, SME in a green economy and internationalization of SME.

Sipa et al. (2015) point out and discuss the competitiveness determinants in polish small companies. They use the results of two direct studies of small and medium sized enterprises conducted in 2006 and 2013 with the use of questionnaires in SME companies in Poland. They come out with a series of factors, the most important of which seem to be company image product brand, power of product price and focus on a specific group of customers.

The existing literature does not capture determinant factors of the SME competitiveness from perspective capital, productivity, technological input, networking, level of competitiveness, and government role by classifying SME from cluster perspective, which is the objective of our paper. In our opinion unfolding this determinant is quite important so as to understand what the East Java need to do in order to increase the competitiveness of their SME. This is where the contribution of our research lies.

Research Methods

The research approach uses quantitative methods. According to Creswell (2014), a quantitative approach is a research approach that aims to test the truth of a theory by explaining the relationships between variables that can be measured. These measurable variables are generally through research instruments, so data in the form of numbers can be analysed using statistical procedures.

The population of this study includes all small and medium industries in the fields of food & beverage, furniture and footwear in East Java, where the number registered at the Department of Industry and Trade of East Java until 2016 in 811,993 business units. However, due to cost and time considerations, researchers did not examine the entire population but part of the population (sample). Meanwhile, the sampling method uses a purposive sampling method, where SME involved in food & beverages, furniture and footwear are selected as samples with specific criteria, with the number of samples is 200 SME. Based on this consideration, we adopted a purposive sampling technique in which samples were taken to include particular areas or groups found in the population, to meet specific criteria (Short et al., 2002). Another technical reason, because of limited on time and research costs. Then, variables and types of data used in this study include SME competitiveness, access to finance/capital, productivity level, utilisation of technology, partnerships/networks, business competition, and the role of government. Types of variables, definitions and operational measurements as presented below:
Table 1: Concept, Operational Definition and Measurement

| No | Concept | Variable Operational Definition | Measurement | Adopted                |
|----|---------|---------------------------------|-------------|-----------------------|
| 1  | SME competitiveness (X1) | Products sold in the market | The ratio of one SME sales to the total SME sales | Katua (2014) |
| 2  | Access to finance/capital (X2) | The ability to obtain capital & raw materials | The proportion of bank credit to total capital | Liang et al. (2017) |
| 3  | Productivity level (X3) | Labor productivity levels | Total output per labor | Okumu & Buyinza (2018) |
| 4  | Utilisation of technology (X4) | Production efficiency | Total output per cost | Yang (2006) |
| 5  | Partnerships/networks (X6) | Horizontal or vertical collaboration with other partners | Long standing of SME | Levushkina et al. (2016) |
| 6  | Business competition (X7) | Business competition | Number of competitors in the same business | Medlin & Ellegaard (2015) |
| 7  | Role of government (X8) | The government’s contribution to the activities of small industries | The ratio of government assistance to the total capital of SME | Tambunan (2008) |

Source: Data processed, 2019

This research uses a cluster method to find out the factors that influence the competitiveness of SMIs by grouping SMIs into groups based on similarity of characters. Cluster methods in this study refer to the statement of Hair (2010) that purpose of cluster analysis are: (i) identifying groups that are naturally contained in the data; (ii) its ability to analyze groups with similar characters and not the study of all individuals in the information; (iii) group structure formed from the results of cluster analysis will give a picture of the relationship of a group with the concepts/variables that have been determined and not proof; (iv) cluster analysis only includes concepts/variables that have special relationships with research objects based on theories, concepts and empirical research results, and (v) concepts/variables chosen characterize the individuals (research objects) formed by the clusters.

This method is popular for exploration of intricate population data patterns (Franke, Reisinger, & Hoppe, 2009) where a researcher will be able to identify homogeneous “clusters” in-group heterogeneity based on the similarity of elements. Wallin (2010) states cluster analysis is a revealing tool that can summarise hundreds of thousands of observations of the various variables by finding them in the form of groups in the data. Hair (2010) states cluster analysis is a group of multivariate techniques where main goal is to group objects based on the characteristics they have. Cluster analysis called as classification analysis, typology formation, or number classification system.
According to Morgan (2001), efforts to explain the characteristics of data have a significant meaning in cluster analysis. In this part there are four basic things that need to be considered Hair (2010): (i) how many samples considered sufficiently representative; (ii) can an outlier be detected and how to detect it; (iii) how to measure the similarity of research objects, and iv) data must be standardized. There are many approaches to answering these questions, but unfortunately, none of them provides sufficient definitive answers. This is then associated with the hierarchical method in which the resulting cluster is a set of partition sequences where the low-level cluster is an aggregation of higher-level clusters (Morgan, 2001). According to Morgan (2001), the hierarchical cluster method processed through a series of successive melting objects into groups. Wallin (2010) states that the hierarchical agglomeration method can be used as an initial step to determine how many clusters naturally exist in the data. The method explained by starting with each observation being seen as an individual cluster and then calculating the distance between observations and grouping the two observations that have the closest distance between the two. These two observations then become one cluster, and then this process continues to be repeated until each observation has entered into an entire inclusive cluster.

### Results and Discussion

**Table 2: SME Grouping in East Java**

| Concept                        | Variable                                      | Cluster       | Mean Centered Cluster | F      | Sig            |
|--------------------------------|-----------------------------------------------|---------------|-----------------------|--------|----------------|
| Competitiveness of SME (X1)    | Products sold in the market                   | 0.0068        | 0.105                 | -1.02  | 1.13           |
| Access to finance/capital (X2) | The ability to obtain capital & raw materials | 0.0725        | 0.451                 | -1.731 | 0.525          |
| Productivity level (X3)        | Labor productivity levels                     | 0.98          | 2.37                  | 0.46   | 2.02           |
| Utilisation of technology (X4) | Production efficiency                         | 2.56          | 4.11                  | -0.41  | 0.52           |
| Partnerships/networks (X6)     | Horizontal or vertical collaboration with other partners | 11.25         | 10.6                 | 1.21   | 1.09           |
| Business competition (X7)      | Business competition                          | 42.21         | 81.27                 | -0.22  | 1.75           |
| Role of government (X8)        | The government’s contribution to the activities of small industries | 0.3021        | 0.0215                | -1.72  | -0.025         |
| Jumlah Sampel IKM              |                                               | 122           | 21                    | 57     |                |

Source: Data processed, 2019
Based on the statistical results in Table 2, SME in East Java grouped into three clusters: cluster I, II, III, based on seven predetermined concepts, namely (i) competitiveness; (ii) financial access; (iii) labor productivity levels; (iv) technology utilization; (v) networking; (vi) level of business competition; and (vii) the role of government. The three clusters produced have varying values in each concept, but the most striking difference is in the concept of competitiveness as measured by the ratio of products sold. The concept of competitiveness shows prominent characteristics that distinguish between clusters I, II and III. This is indicated by the value of the statistical F of this concept the largest and most significant. Thus, the concept of competitiveness becomes a label or sign that can accurately explain the natural clusters in the data. Furthermore, by looking at the average score, the cluster I has the lowest average ratio of products sold by 0.68 percent, cluster II with the highest average ratio of products sold at 10.5 percent, and cluster III with the average ratio product sold was 3.3 percent. Thus, the resulting cluster groups explained as follows: Cluster I: Low Competitiveness, Cluster II: High Competitiveness, and Cluster III: Medium Competitiveness.

Cluster I with low competitiveness on average has a sales ratio value of 0.0068 or 0.68% of the total sales of IKM products in East Java. Meanwhile, if viewed from the financial access, which is equal to 0.0725, which means the total capital owned by low competitiveness SME, in average 7.25% of them credited from banks. The concept of productivity level shows how much production one worker can produce. Thus, in cluster I, one worker was able to produce an average production of Rp. 984,927.66. The concept of using technology shows the ratio of products to production costs. Based on the analysis results, SME in cluster I has an average technology utilization of 2.56. Every one rupiah of production costs used by low competitiveness SME is able to produce products worth 2.56 rupiah. Then, the concept of partnership (networking) reflects the length of time that the SME business has been running, and assuming if SME established longer than other, will has more partnerships. From the results of the analysis, it found that SME cluster I had been operating for an average of 11.25 years. The level of business competition shows the number of competitors in the same business field as the SME. Low competitiveness SME face an average of 42 other SME operating in the same field. The concept of the role of government shows the amount of government assistance to SME. Each year, in cluster I, on average, receives assistance from the government in the amount of 0.3021 or 30% of the total capital. Assistance received from the government can be in the form of business capital, raw material support, production equipment assistance, as well as training, guidance and assistance.

Otherwise, in the cluster II with high competitiveness, as follows: (i) the ratio of sales of high competitive SME products in average is 10.5% from the total sales; (ii) the total capital in high competitiveness SME in average is 45.1% source from loan banks; (iii) high competitiveness SME workers are able to produce a product worth Rp2,373,242.5 (iv) per one rupiah the cost used by high competitiveness SME on average capable of producing products is Rp4.11; (v) high competitiveness SME operated in average 10.06 years; (vi) the average competitive SME faced 81 similar business units as competitors; (vii) high competitiveness SME in average accept the role of the government at 2.15% from the total capital they have.
From cluster III SME with medium competitiveness, as follows: (i) The average sales ratio of SME products is 0.0327 or 3.27% from all SME product sales; (ii) The ratio of capital originating from banks in this cluster is moderately competitive in average 22% from the total capital; (iii) workers are moderately competitive with average able to produce Rp. 1.326.341; (iv) medium competitiveness SME in average is able to produce a product that value Rp. 7.2, from every one rupiah they used; (v) The average medium competitiveness SME have been in business for 12.02 years; (vi) SME with medium competitiveness in average have 65 competitors; (vii) the total capital owned by SMEs that are moderately competitive, in average of 10.22% from the role of the government. Based on the statistical results of the cluster analysis as described above, the explanation based on the concept, described as follows:

**Competitiveness of SME**

In this concept, cluster I shows that the ratio of products sold is still very low (0.68%). This shows that the ability of SMEs to drive product sales and market dominance is still very weak, so that SME competitiveness is still weak. Meanwhile, in cluster II the average score of the ratio of products sold was quite high (10.5%), meaning that the ability of SMEs to control market share was relatively high. Meanwhile, in cluster III shows the average score of the ratio of products sold in the medium category (3.27%), meaning that control of the market share going to be moderate. If we look at the statistical F figures (72.13) and significance (0.00001), the concept of competitiveness is strongly show as the main characteristic between clusters. So, between clusters I, II, and III are really different in terms of the ability to control market share (competitiveness).

**Access to finance/capital**

In this concept, cluster I have an average score of a bank credit ratio of 7.25%. This means that SMEs in this cluster are not capable enough to access capital from banks. SMEs generally have difficulty in getting capital from the banks. This can occur due to several factors, for example, according to banking calculations, SMEs have not met the requirements to be able to receive loans based on criteria set by banks. For example, SME profitability is not strong enough, collateral value is low, and others. Meanwhile, in cluster II the average score of the bank credit ratio showed a high number (45.1%). This means that SMEs have good ability to access capital from banks. A good financing relationship between banks and SMEs in this cluster might be because banks seeing that they SME sufficiently bankable. Whereas, in cluster III the statistical results show an average score of bank credit ratio at a moderate level (22%). This means that the SME group is not too difficult to deal with obstacles to financial access to bank credit even though the intervening period is not too easy. Based on the F value of statistics and significance, the concept of financial access shows other characteristics that reinforce differences between clusters. This noticed by the high F statistic (51.22) and the significance value (0.00011). That is, between clusters I, II, and III differ in terms of the ability of financial access from banks.
**Productivity Level**

In this concept, SME cluster I has an average score with a product value per worker of Rp. 984,927.66. This means the level of labor productivity is low. Labor productivity at lower level may caused by the small number of workers and for other reasons such as the still small production capacity. Meanwhile, SME in cluster II show the average score with a product value per worker is quite high, Rp. 2,373,242.5. The high labor productivity in cluster II has an indication if existence of a production process involves the use of technology, the availability of infrastructure facilities to support the production process, so that production efficiency had achieved. MSE in cluster II can easily utilize technology because it is supported by the availability of adequate capital. Otherwise, SME in cluster III has an average labor productivity score of Rp. 1,326,341, or in the medium category. If you look at the value of F statistics and significance, the level of productivity is another character that reinforces the differences between clusters, as evidenced by the high F statistic (12.15) and the significance value (0.00910). That is, between clusters I, II, and III differ in terms of labor productivity.

**Utilisation of technology**

In this concept, SME in cluster I show a very low average score (2.56%), indicating that SME in the cluster I are generally still weak in terms of technology utilization. The reluctance to use technology in this cluster may be due to factors of limited costs, understanding and mindset of the SMEs themselves, production capacity and so on. Meanwhile, in cluster II show a moderate average score (4.11%), this indicates that SME in this group have an indication that the use of the latest technology has begun to decline because the existing technology is sufficient to be able to bring production efficiency and achieve production capacity targets. Meanwhile, in cluster III, it actually started using technology, based on the average score on this concept at a high level (7.22%). Behavior to utilize this technology is very reasonable to catch up with the ability to control the market (competitiveness). Based on the value of F statistics and significance, the concept of technology utilization is another characteristic that reinforces the differences between clusters, as evidenced by the high F statistics (27.17) and the significance value (0.00320). That is, between clusters I, II, and III differ in terms of technology utilization.

**Networking**

In this concept, SME cluster I has an average score in the medium category (11.25). This means that MSE has sufficient partnerships. Likewise, SME cluster II, with an average score in the medium category (10.06), means that SME has built a good partnership with other parties. SMEs in cluster III have a higher average score (12.02). This means that in this group, the enthusiasm of SME to build partnerships with outsiders is very high, especially to increase market competitiveness that is still wide open. Based on the statistical F value and significance, the concept of partnership is a character that is not strong enough as a label that distinguishes between clusters, as evidenced by the very low statistical F statistic (1.17) and the significance value (0.62810). Therefore, between clusters I, II, and III there was no significant difference in terms of partnership (networking). SMEs that are included in Cluster I are likely to be included as members of Clusters II and III, vice versa.
Business competition

In this concept, SMEs in cluster I have an average score in the low category (42.21), which means the number of competitors faced by cluster I SMEs is quite low. This condition can occur due to the type of SME business that is easy to run, does not require much capital, so everyone has an easy opportunity to open the same business. Meanwhile, SME in column II has an average score in the high category (81.27), which means that the level of competition is getting heavier. The high level of business competition in SME cluster II may occur because businesses who want to win the competition for market share is not small. Each is armed with the capacity and capabilities possessed. Based on the statistical F value and significance, the concept of the level of business competition is a strong character as a label that distinguishes between clusters, as evidenced by the high F statistic (18.13) and the significance value (0.00827). Therefore, between clusters I, II, and III there was no significant difference in terms of p, between clusters I, II, and III are indeed different in terms of partnership (networking).

Role Government

In this concept, SMEs in cluster I have an average score with a high category (30.21%). This indicates that the SME has received considerable support from the government in various forms. For example, capital assistance with low interest, assistance machinery / production equipment, guidance, training, and assistance. While SME cluster II had an average score in the low category (2.15%), which indicated that SME received assistance and the role of the government was getting smaller. This is rational, because the SME in cluster II had considered capable enough to take care of themselves.

Based on the F statistical value and significance, the concept of the role of government is another character that reinforces the differences between clusters. It evidenced by the high F statistic (32.5) and the significance value (0.00570). Therefore, between clusters I, II, and III differ in terms of the role of government.

Based on the results of statistics and analysis, it can be explained the relationship between cluster groups and the concepts that become their characteristics, as follows:

| Table 3: Characteristics of IKM by Concept |
|------------------------------------------|
| Concept                        | Low Competitiveness | Medium Competitiveness | High Competitiveness |
|-----------------------------------|---------------------|------------------------|----------------------|
| Financial accessibility           | Low                 | Medium                 | High                 |
| Productivity Level                | Low                 | Medium                 | High                 |
| Technology Utilization            | Low                 | High                   | Medium               |
| Business competition              | Low                 | Medium                 | High                 |
| Dependence on the Government      | High                | Medium                 | Low                  |

Source: Data processed, 2019
Conclusion

The conclusion based on the analysis, SMEs with high competitiveness are able to increase efficiency in 2 fields, production and marketing. Meanwhile, SME that have medium competitiveness who are superior in technology, so they can be classified in the creative industry. In the current globalization era, the way to increasing competitiveness is through increasing the ability for access financial institutions, increasing labor capabilities, reducing the level of dependence from the government especially direct government assistance, reducing the risk of failure in high competition through, with: (i) facilitation of standardization , (ii) enhancing export capabilities, and (iii) collateral guarantee, and protecting the interest in innovating through patent facilitation (IPR).

What we however saw in this paper is that SME competitiveness in East Java is vital not only for the SME themselves but also for the province and countries. It is of great importance to identify the characteristics of economic activity that countries with successful SME exhibit. In this paper, we were able to show that SME competitiveness is definitely linked to their performance as competitiveness of sme, access to finance/capital, productivity level, utilisation of technology, partnerships/networks, business competition, and role of government. A province or country that wishes to foster SME competitiveness needs to pay attention to the development of these figures and make sure they move to the appropriate direction. For the next study we hope there are some developing method based on our research.

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