

THE STRATEGY OF DEVELOPMENT CLUSTER SMEs OF APPLES DODOL BY INTEGRATION K-MEANS CLUSTERING AND ANALYTICAL HIERARCHY PROCESS METHOD

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Abstract

The purpose of this research is to determine the grouping of SMEs apple dodol in Batu and to determine an appropriate development strategy for each cluster. The method of grouping using K-means clustering which is integrated with the Analytical Hierarchy Process (AHP) method to determine the priority of the development strategy for each cluster. Variables used in grouping include the production capacity per month (X_1), long of operation (X_2), investment value (X_3), the average sales revenue per month (X_4), the amount of assets of SMEs (X_5) and number of labor (X_6). Factors to determine the development strategies are industry cluster, government also related and supporting industries. The number of sample for SMEs apple dodol consisted of five units. The result showed formed 2 clusters of SMEs apple dodol are created by k-means clustering method. The result of AHP method indicates the priority of development strategy for SMEs dodol apples, in cluster 1 is improving the quality and standardization of product and cluster 2 is increasing marketing access.

Keywords: industry cluster, SMEs, apple dodol

1. INTRODUCTION

The productivity of apple in Batu is quite high about 17.05 ton / ha. It encourages the industry of processing apple. Apple (*Malus sylvestris*) is used as processed product such as apple crisps, apple cider, apple vinegar, dodol apple, apple syrup. Commonly, apples are in sub grade quality (Hidayat, 2009). Clustering in industry is important because of the condition of industrial competition. In this global era, industrial competition has been changing into supply chain competition from individual competition. In the future, the industrial competition will base on clustering (Partiwi, 2007).

Some problems faced by EMSs of apple as processed product especially in EMSs of apple dodol such as less of standardization of product, limited access of market, limited fund, less of knowledge about the market strategy and the business itself, limited partnership with others, also the business climate is still not conducive

because of the competition with large industries. So far, the clustering of EMSs of apple is still based on the activities, area, and scale of EMSs.

Clustering and classification of EMSs apple dodol is needed to help the related and supported partner to solve the problems in development of EMSs. According to Schmitz (2004), cluster is a group of companies which is altogether in the same area and work in the same sectors. The benefits of clustering are open the opportunities of employment greater, ease in capital, access to supplier, and the input of excellent service also transfer of information and knowledge. Industry cluster development has four main factors and two support factors called as Diamond Porter Model. The main factors are (1) condition, (2) the industries them self and supported partner (3) strategy, structure and competition also (4) demand. The support factors are (1) chances and (2) government (Porter, 1998).

2. RESEARCH METHOD

The sample of this research is taken from the members of SMEs' group of dodol apel in Batu which consisted of five units, namely Agro Citra Abadi (SMEs A), CV. Bagus Agriseta Mandiri (SMEs B), Petik Apel Farm (SMEs C), Barokah Jaya (SMEs D), and UD. Harum Manis (SMEs E). The expert respondent consists of three people who came from Department cooperatives, trade and industry Batu city, Businessmen Association Batu city and SMEs networking of Batu "GRAS (Guyub Rukun Agawe Santosa)". The research instrument used questioners. AHP method used the comparison

scale on 1-9 (Hemaida and Everett, 2003; Liu and Hai, 2005) and k-means clustering (Dulyakarn, and Rangsaseri, 2002; Shovon and Haque, 2012; Cahyo et al., 2012; Ediyanto et al., 2013).

3. RESULTS AND DISCUSSION

The data result based on the k-means clustering method showed there are two clusters have been formed with twice iteration to reach optimal. The respondent characteristics of each cluster can be seen on the Table 1.

Table 1. The Characteristics of Respondent Of Each Cluster

No.	Characteristics	Cluster 1 (SMEs A, C, dan D)*)			Cluster 2 (SMEs B dan E)**)		
		Center Cluster	Minimum	Maximum	Center Cluster	Minimum	Maximum
1.	Production Capacity per month (kg)	1,016.67	600	1,250	963.5	27	1,900
2.	Operation (year)	4	3	5	12,5	11	14
3.	Investment Values (Rp)	12,940,666	500,000	28,322,000	373,500,000	247,000,000	500,000,000
4.	Selling average per month (Rp)	31,333,333	20,000,000	50,000,000	25,850,000	2,200,000	49,500,000
5.	Total asset (Rp)	47,666,666	10,000,000	100,000,000	360,000,000	345,000,000	375,000,000
6.	Employee (person)	10	7	13	37	25	48

Based on Table 1, the members of cluster 1 of EMSs dodol apple is classified as small enterprises. It is supported by the condition of management which is still traditional, based on family management. There is some of EMSs management still based on family management. In this management, the status of member is not clear, so all members have rights to make decision also, there is no separation of financial between enterprise and family (Samosir, 2006).

In cluster 2, EMSs of apple dodol tends to be established than cluster 1 because the amount of the employee is greater. Fatima cited by Evelyn (2007) explained the member of employee also influenced significant and positive to the income. If there is more active employee, the enterprise(s) will establish too. The possibility to develop in cluster 2 is higher if it is supported by the spreading of market access. Both government and private enterprise could increase the EMSs by supporting through the facilities to transfer the knowledge and technology information to the entrepreneur also

develops the information technology network (Setyaningsih, 2012). The priority to determine the industry cluster development of apple dodolin Batu used Analytical Hierarchy Process (AHP) method. Hierarchical structure of industry cluster development strategy consists of four levels, industry cluster development, factors, purposes, and alternative strategy. The establishment of industry cluster development used the same structure and expert for each cluster (Badri, 2012). Hierarchical of industry cluster development of cluster 1 can be seen in Figure 1. In cluster 1, level 1 showed the highest factor, government about 0.56. Purpose is on level 2 as the purpose to improve and increase the quality of product about 0.40. Alternative strategy is on level 3 as the increase of quality and standardization of product about 0.44.

The factor of government has the highest percentage about 56% in factor of development of industry cluster of dodol apples. During this time, government of Batu provides facility in form of PLUT which has function as office to

record data and helps the EMS. Both the EMS which is already operated and the EMSs will operate and grow. It is also helping the market of the product by selling a little in that office. It is appropriate to the Department cooperatives, trade and industry vision about cooperation, EMSs, industry and trade become a company which grows and develops well, tough and independent with a high compete. So they can be as the main role in economy of Batu which based on the market mechanism, fair and as the activator of society economics (Diskoperindag, 2014).

The effort of government to develop EMSs is created Businessmen Association Batu City. Businessmen Association Batu City is based on the group approach that used to solve the problems of entrepreneurs. It brings a hope to entrepreneurs to solve their problems more easily. Government also supports and provides facility to the group and networking of EMS called GRAS through coaching of Department of Cooperatives, SMEs, Trade and Industry and the Department of Youth, Sports and Employment of Batu. Government of Batu supports EMS by providing outlets as place to sell or as a market of EMSs. Part of EMSs got the facility in form of machine and production tools. The facility is given based on the priority and rights of bureau also coaching of entrepreneur's management. GRAS has routine schedule, one every month and invites the members of EMSs.

Starling in Muluk (2007) asserted the duty of local government is different from private sectors, provides the public goods than private goods. The aim is to create the fairness. So, the local government will always give the best service for the society. In this case is about the government effort to the development of industry clusters related to the service to facilitate the needs of development small enterprise in Batu.

The highest priority is on the improvement of product quality variable. Improving the quality product is the aim of every entrepreneur. It will increase the selling values of the product to high values. The improvement of product quality creates the possibility to make apple dodol with various tastes and it will develop the product itself. The higher product quality makes consumers more satisfied, sold the product and competitive with compete. It also increases the market and volume of selling product in high values. A great product with a high quality is a product without weakness (Resmi, 2011). The

strategy of increasing the quality and standardization product has the highest percentage. It determines the success of industry to get a good networking and loyal consumer of the product. The loyalty of consumer happened because of the satisfaction of the serve and the product. They also have a good commitment to the product in case of use and buy again the product. Therefore, the EMSs must keep and increase the quality product of apple dodol so the consumer will always satisfied (Nia *et al.*, 2014).

Hierarchical of industry cluster development cluster 2 of apple dodol can be seen in Figure 2. In cluster 2, the level 1 showed the factor which has the highest contribution to development of those related and supported industries about 0.61. In level 2, the purpose is to improve the quality products about 0.37. In level 3, the alternative strategy is to increase the marketing access about 0.28.

The factor of industry cluster is the highest about 61%. It is the priority to development of industry cluster in members of EMSs apple dodol cluster 2. This factor refer to the input which needed by SMEs apple dodol to compete in an industry. The input itself refers to the supporting input to reach goals of the enterprise. Soekarno (1986) explained that the reaching goal of the company will turn out well if the company had the capability to manage all a source optimally. The sources maintained by the company based on management sciences is related to man (employee), money (money needed), methods (way or a system used), materials (the necessary materials), machines (the machines needed), and markets (market, to spread production).

The highest priority is on the variables of improve the quality of products. The quality of SMEs products apple dodol in members of cluster 2 is well maintained. The selling price in market reflects the product quality marketed. It is possible that good product quality will add the value of selling products and can be accepted by the consumer. Consumers are also looking for the good products quality and hope a satisfaction of its. That could be second consideration for consumer after the product quality which is suitable to purchasing power. It is in line with Crosby cited Resmi (2011) stated that the quality of is conformance to requirement, appropriate with standardization. A product has the quality if appropriate to the quality standard. It is covering raw materials, production process and finished goods. Increased access marketing strategy has a

higher percentage. Marketing can be considered to be a highest level in satisfying the needs and human desire. The markets access is a series of organization that mutually dependent and involved in the process to make a product or service for use or consumed (Kotler, 1997). The marketing access is to do two vital points to reach the goals, make a group of products and distribute those products (Swastha, 2005).

The marketing area of SMEs apples dodol marketing products Batu City is still in Malang and its surroundings, as well as other big cities such as Jombang and Surabaya. Most of the apples dodol SMEs market their products at tourist attractions in Batu City. Potential for companies because tourist attractions tend to be crowded with visitors so that promotions and product opportunities to sell are quite high. The use of distribution channels for product promotion to outlets where consumers can buy them is called push strategy (Kotler, 1997). Lack of knowledge about marketing is caused by weak mastery of management aspects so that market participants do not work professionally.

The marketing expansion that is carried out will make the product more well known and of course also affect the level of sales and the amount of profit that will be obtained by SMEs. With the expansion of the marketing network to the modern market, it is expected to make apple dodol products more widely known to the public as a typical gift of tourism in Batu City. The expansion of the marketing network to the modern market is very possible if SMEs can meet the product standards demanded by modern markets such as the minimum business license number of certification from government likely licensi, halal certification and BPOM or LPPOM, as well as the standardization of other products. Product standardization will make the products produced getting better quality so that they can compete with other products. Because, the biggest challenge in the future for SMEs is the standardization of products and market access (Frisdiantara and Mukhlis, 2016).

4. CONCLUSIONS

Based on K-means clustering method has formed two cluster of SMEs apple dodol in Batu. The Cluster 1st of SMEs of apple dodol is classified as small enterprises with SMEs members Agro Citra Abadi, Petik Apel Farm and Barokah Jaya. The Cluster 2nd of SMEs of apple dodol is classified as medium enterprises with

SMEs members CV. Bagus Agriseta Mandiri and UD. Harum Manis. Based on AHP method indicates the priority of development strategy for SMEs dodol apples, in cluster 1 is improving the quality and standardization of product and cluster 2 is increasing marketing access.

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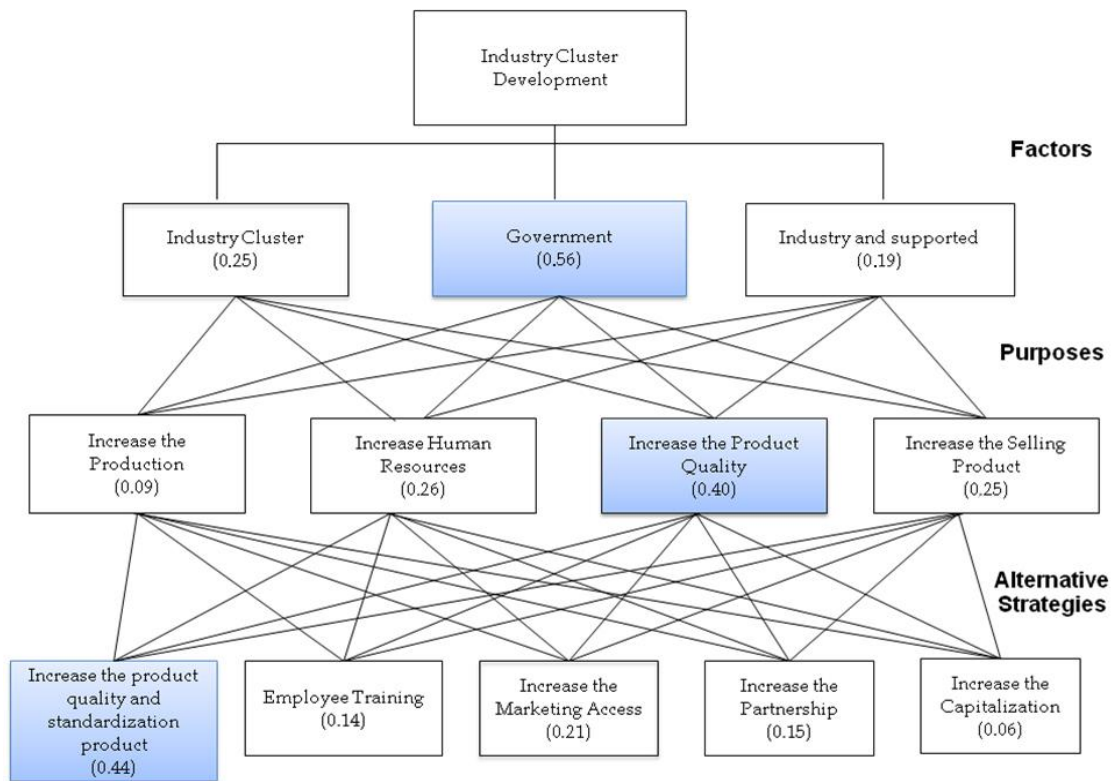


Figure 1. Hierarchical industry cluster development of apple dodol cluster 1st