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Using Cluster Analysis Study to Examine the Successful Performance Entrepreneur in Indonesia

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Abstract

In every country, the Small and Medium Enterprises (SMEs) always give a lot contribution in the industrial development. This study tries to examine the successful performance SMEs using cluster analysis to map the pattern of growth mode and strategies. Therefore the study will conduct by collect the data of growth of the business, firm and market turnover, goals and objectives, level of education, comparison with the competitor, management principle, etc as the variables for cluster analysis. The data used for this study collected from questionnaires, with the entrepreneurs as the respondents. The expected result of this study is forming the several clusters within the SMEs which characterized as survival cluster, innovators with continuous improvement cluster, network of success cluster and need support cluster. The result can be used as a guidance of the SMEs to make their policies to improve their business becoming successful in the future. Each SME has different type, so they can refer for the information to the similar business to make their own policies.

Keywords **: Small-medium entreprise, cluster analysis, entrepreneur, performance, Indonesia**

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1. Introduction

Small and Medium Enterprises has a very helpful role in economic development every country. Approximately round 9500 SMEs registered in the unity of SMEs in Indonesia, while there are many more SMEs that are not listed (smescoindonesia, 2011). It is quite reflect that the people of Indonesia sing several years ago have been concerned with this field to help the nation's economy. Given its role in development, small and medium enterprises continue to be developed in a spirit of kinship, mutual strengthening between small and large businesses is to ensure equal distribution of welfare and prosperity as possible for the people of Indonesia. The number of SMEs in Indonesia reflects that SMEs suitable to be applied, because Indonesia is a country that has a lot of population so that the customers of SMEs is estimated many too where it is a precursor of the development of SMEs in Indonesia.

One thing to remember for the development of SMEs is not merely a step to be taken by the Government. SMEs has own party to develop itself, can swing a step together with the Government. In addition to the government and SMEs, the role of the banking sector is also very important in relation to all matters concerning the funding, especially from the lending side of banking policy or determination. Furthermore, related to availability of funds or capital, the role of investors both from within and outside the country, we also cannot disregard (Sharma and Wadhawan, 2009).

The success of running a business is very crucial for any entrepreneur. A lot of SMEs in Indonesia and if the majority of the SMEs are failing, then the welfare and prosperity of the people of Indonesia would be difficult to achieve. This study will look further into the direction of the management structure which established the business. Based on this case, show up several question related to that thing, which is the first question will be how the successful SMEs can be characterized and the second question is the SMEs can be clustered by the successfulness thing.

From the research question like that, this study made with the aim to map out a strategy and business growth of SMEs is carried out using cluster analysis. The performance one country is largely based on the performance of SMEs in that area, which is in this study analyze the performance of SMEs in Indonesia. Performance management is a management process designed to link business objectives with the individual goals in such a way that both individual goals and business objectives can go hand in hand. In this case not only for workers who can reach their individual goals, but he also participated in the achievement of business goals, which makes them motivated and have the satisfaction and also increasing the successful of the SME itself. Using the cluster analysis, this study will divide the SMEs in Indonesia into several cluster which each cluster will show the characteristic that can be the based resource to make own policies for the development of every SMEs itself.

2. Previous Research

Research that related to the SMEs and also the clustering grew rapidly during the last decade. Lots of angles can be obtained by digging the topic of SMEs and cluster analysis. Many authors conducted a study on the performance of SMEs because SMEs will have an effect on the economy of a nation. On the other hand, many authors who did research on the topic of cluster analysis used different variables according to the object that they elaborate.

Balaton (2008) did the research about enterprise strategies in Hungary in the period of joining the European Union. The purpose is to describe the strategies of enterprise in Hungary parallel with joining the European Union and to evaluate the preparation of firms for the competitive conditions within the European Union. The paper is based on a questionnaire survey to the top managers of medium sized and large enterprises and data were analyzed by using mathematical and statistical methods, among them factor and cluster analysis. The

paper deals with both content and process characteristics of strategies. Attention is devoted to issues like strategies alliances, mergers and acquisitions, research and development, corporate governance.

Metaxas (2010) conducted the research about small medium enterprise related to the cluster analysis. The article investigated the importance of urban characteristics or urban assets (agglomeration economies, urban infrastructures, labor and cost factors, development policies, etc.) for firms' competitiveness in Southeastern Europe. The analysis uses primary data from 310 small and medium sized firms in Southeastern Europe. The author used factor and cluster analysis to investigate the importance of particular factors for the competitiveness of firms and reached some valuable conclusions for firms as well as the cities where these firms are located, revealing the significance that these factors have for relevant firms and cities in the wider zone of Southeastern Europe.

Kotey and Meredith (1997) had the research related to the enterprise performance. The aim of the research was to test empirically the relationships among personal values of owner/managers, the strategies they adopt in operating their business and the performance of their business. The research file gaps in empirical research on strategy and strategic management in small firms. Unlike in existing research, a holistic approach to strategy is adopted. Data for the research were a mail survey of small furniture manufacturers. The sample was divided into cluster using Ward's minimum variance method. Difference among the clusters with respect to personal values, strategies, and performance were examined by multivariate analyses of variance using deviation contrasts. It was found that certain profiles of personal values correspond with certain strategic orientations. In conformity with previous research, an association between business strategy and enterprise performance was confirmed. Recommendations are made in the areas of government policy and delivery, and financial and management assistance to small firms.

Yusuf and Saffu (2005) tried to research about planning and performance medium enterprise operators in a country in transition. This research examined the relationship between planning and performance of small and medium enterprise operators in a country in economic transition. The literature of planning and performance relationship reports mixed findings. In a period of uncertainty, as exemplified by conditions of economic difficulties, one would expect firms to do more planning. On the contrary, our study shows that economic difficulties do not encourage firms to plan seriously. This research also shows that firms that plan do not necessarily experience increased performance, with the expectation of the manufacturing sector. This research contributes to our understanding and appreciation of situations in which planning does not necessarily add significant value to organizations (by way of increased performance).

3. Literature Review

Literature review is the chronological of all the sources to analyze critically a segment of a published body of knowledge through summary, classification, reviews of literature, and theoretical articles. This literature review will explain about cluster analysis that has been used and the SMEs itself.

3.1 Small and Medium Enterprise

Small and medium enterprises (SMEs) try to make harder the market diversification, promote innovation, and provide many employment opportunities in it. SMEs are usually using the credit from the bank and it will insufficient and vulnerable to credit crunches during financial crises (Barth, et al. 2011).

From several studies that have been made, it was concluded that there are three important factors of success as an entrepreneurs, those were age, experience, and education.

- Age. Zimmerrer and Scarborough (1998) conducted a study and concluded that most of the entrepreneurs' start their businesses in United States had age around 30 and 40 years. However, many other researchers said that there was no age limit for their entrepreneurial aspirations, such as Staw (1991) who came to the

conclusion from his research that the age factor is not the factor that determined a person to be an entrepreneur, but with enough training that makes an entrepreneur had the courage being the entrepreneur.

- Experience. Staw (1991) concluded that the experience was the key to become successful entrepreneurs. Employers who already have a lot of experience will be better to find a way to open a new business compared to the others entrepreneurs who had experience from other fields.
- Education. Meng and Liang (1996) obtain results that entrepreneurs who have high educational background, tend to be more successful than other entrepreneurs. About 70% of successful entrepreneurs graduated from university, while about 30% did not graduated from university.

Sharma and Wadhanan (2009) did the research about the SMEs successful cluster analysis. At that research they add several variables that used for the cluster analysis. Those are the transition in the business, whether the firm has stayed in the original business, change in Firm's Management principles and practices, change in turnover, change in market demand, goals and objectives, performance compare to the competitor, satisfaction with the firm's performance and growth orientation. Based on those variables, the research will give the result of cluster with the different characteristics.

3.2 Cluster Analysis

Cluster analysis is a group of multivariate technique whose primary purpose to group objects based on the characteristics them posses. It has several names of cluster analysis, such as Q analysis, typology construction, classification analysis and numerical taxonomy. Those names ware using in the different disciplines such as psychology, biology, sociology, economics, engineering and business. The cluster analysis is different with the factor analysis, because in the cluster analysis group's objects, meanwhile in the factor analysis is primarily concerned with grouping the variables. In additional information, factor analysis makes the grouping based on the patterns of variation (correlation) in the data whereas cluster analysis makes grouping on the basis of distance (proximity) (Hair, et al. 2010).

The K-means algorithm gives the simple or flat condition, because it just gives a single set of clusters, with no particular organization or structure within them. But it can be used to the cases for more distantly data related to the others. So hierarchical clustering is the opposite of it. There are two approaches to hierarchical clustering those are from the "bottom up" which is grouping small clusters into larger ones, or from "top down" splitting big clusters into small ones. There are called agglomerative and divisive clustering. The approach that usually use is agglomerative clustering, which have the simple algorithm (Paul, 2004).

The K-means algorithm is a popular data clustering algorithm. To use it requires the number of clusters in the data to be pre-specified. Finding the appropriate number of clusters for a given data set is generally a trial-and-error process made more difficult by the subjective nature of deciding what constitutes 'correct' one. A new method to select the number of clusters for the K-means algorithm has been proposed in the paper. The new method is closely related to the approach of K-means clustering because it takes into account information will be the mirror of the performance of the algorithm. The proposed method can suggest multiple values of K to users for cases when different clustering results could be obtained with various required levels of detail. (Pham, et al. 2004).

3.3 Performance Management

Performance management is a strategy and approach to deliver successful results in the organization by improving performance and also develop team and individual capabilities. Fening (2008) investigated the relationship between quality management practices and SME performance in Ghana. He found the result to test 7 hypothesis, those are:

1. Quality leadership practice correlates positively to SME performance. Results indicated quality leadership correlates positively with performance hence the alternate hypothesis is accepted.
2. Strategic planning will influence the performance of SMEs positively. The results accepted the null hypothesis that strategic planning influence performance positively.
3. Proper implementation of the information and analysis variable will increase firm performance. There was a very weak significant relationship between the two variables though the alternate hypothesis is accepted.
4. The implementation of human resource practices will enhance firm performance. There is positive significant relationship between human resource development and management and performance
5. A positive relationship exists between process management and SME performance. There was a positive significant relation between quality process management and performance.
6. Customer and market focus will positively influence the performance of SMEs. The results of the test strongly support the alternate hypothesis.
7. There is weak correlation between operational and business results and firm performance.

Based on that research, this study will include 6 variables as a standard, to measure the successful performance of SMEs in Indonesia.

4. Research Methodology

This study was focused on the SMEs that have more than 5 employees and also have been run more than six months. This study tried to find the characteristics that have been develop for each cluster of SMEs. Probability method is the best method to use for the most powerful statistic analyses on the result. Convenience sampling was used in this study to collect the data of 100 SMEs as a sample size. The study was conducted during March-April of 2012. The primary data was collected with literature review which comes up with several variables. Rather than giving a direct interview, questionnaires were developed for data collection and distributed to the respondents with the hope of achieving a high rate of return. Those variables that have been asked in this questionnaire such as the age of the enterprise, the number of employees, the number of owners, the kind of selling product, the number of branch, type of leadership, using planning, how much customer, etc. Those variables really connect to the major qualification of characteristic of the enterprise, characteristics of the entrepreneur, entrepreneurial dynamics, and the performance management of the enterprise itself.

Cluster analysis used as a based method to reach the goal of this study. To get the number of cluster, this study do several repeated attempts to see the difference in the means distance between initial of each cluster. K-Means clustering was used in this research to get the detail of characteristics for the each cluster. Discriminant analysis was also used in this study to assess the capacity of the variables to predict the classification of enterprise within clusters. To make sure that the result was appropriate, it used canonical discriminant analysis for the verification of the data. Here are the variables that have been used for collect the data:

Table 1. Variables in the Questionnaire

Enterprise Characteristics	Entrepreneur Characteristics	Entrepreneur Dynamics	Performance Management
No. of Employee	Age	Growth in Turnover or not	Leadership
Goal and Objective	Experience	Transition in Business has Taken Place	Strategic Planning
Stayed in Original Business	Education	Management Principle Change	Implementation to the Information
Age of Enterprise		Satisfaction with the Enterprise Performance	Human Resource Practices
Enterprise Turnover Change		Comparison with the Competitor	Quality Process Management
Market Demand Change			Customer and Market Focus

5. Data Analysis

In this chapter will explain the characteristics of the four clusters which based on 20 variables that have been asked on the questionnaire that measure for successful SMEs.

Table 2. The Minimum Distance between Initial Clusters

Number of Cluster	Minimum Distance Between Initial Cluster
2	11.790
3	10.050
4	8.544
5	8.544
6	7.681
7	7.416
8	7.416
9	7.348
10	7.141
11	7.000
12	7.000

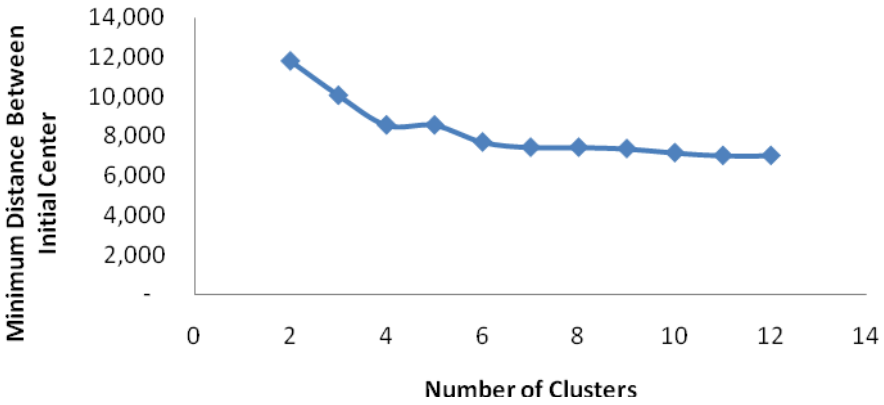

Fig 1. Plot of Data Minimum Distance between Initial Center of the Number of Cluster

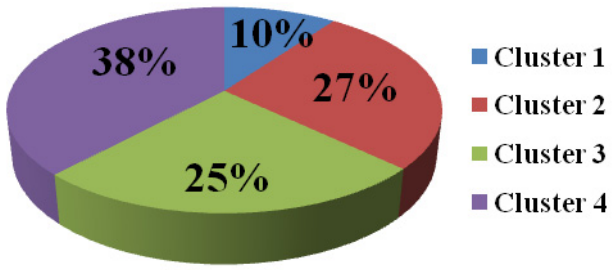

Fig 2. Pie Chart of Proportion Size of Cluster from the Sample

Table 3. Characteristics of Cluster Based on Mean and Standard Deviation

Variables	Cluster 1		Cluster 2		Cluster 3		Cluster 4	
	N = 10		N = 27		N = 25		N = 38	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
No. of Employee	1.70	1.25	3.81	1.21	1.24	0.66	1.34	0.48
Goal and Objective	2.70	1.06	3.70	0.72	1.92	0.81	3.26	0.92
Original Business	1.30	0.67	2.33	1.21	2.12	1.42	1.76	0.91
Age of Enterprise	1.50	0.71	4.81	0.56	4.04	1.31	4.45	0.86
Enterprise Turnover Change	1.30	0.48	2.85	1.32	1.48	0.82	1.66	1.07
Market Demand Change	2.10	0.99	3.44	0.85	3.04	1.37	3.11	1.16
Age	2.10	0.88	4.04	1.22	3.52	1.26	3.61	1.20
Experience	2.00	0.82	4.85	0.53	4.72	0.68	4.89	0.31
Education	3.40	0.97	3.63	0.97	2.96	1.34	3.03	1.24
Growth in Turnover or not	3.10	0.88	3.85	0.66	2.40	1.00	3.61	0.82
Transition in Business has Taken Place	1.40	1.26	2.74	1.35	2.40	1.32	1.29	0.57
Management Principle Change	2.50	1.27	3.93	0.62	3.20	1.12	2.76	1.08
Satisfaction with the Enterprise Performance	3.50	1.27	3.44	0.85	2.48	0.96	3.68	0.66
Comparison with the Competitor	4.10	0.74	4.52	0.58	3.88	0.93	4.11	0.80
Leadership	3.60	0.70	4.04	0.44	2.88	0.78	3.92	0.67
Strategic Planning	3.40	1.17	3.56	0.64	2.48	0.92	3.29	1.14
Implementation to the Information	3.50	0.97	3.78	0.70	3.24	0.93	4.05	0.61
Human Resource Practices	3.30	0.95	3.19	0.92	2.76	1.05	3.74	0.72
Quality Process Management	3.90	1.10	3.63	0.69	3.20	0.91	3.87	0.70
Customer and Market Focus	4.60	0.52	4.52	0.75	4.00	0.82	4.34	0.58

Based on the minimum distance to the initial cluster, the distribution of 4 clusters in this study showed significant differences in the characteristics of the four views on the classification variables which included in questions on the questionnaires. Those classifications were an enterprise characteristics, entrepreneur characteristics, entrepreneur dynamics and performance management.

When analyzed the fourth cluster, it will be more prominent for one classification. This situation will be happen because it can be influenced by other classification. For example, if one cluster was more emphasis on entrepreneur dynamics classification, then it could happen because the details of enterprise characteristics which indicate that the business just goes on and it requires for the further development.

5.1 Cluster 1

Of the total 100 SMEs surveyed, this cluster has 10 members who have the characteristics of small companies which were still new and established. They still survive in the original business, because the average of them was formed about 6 months and there is quite a change of customer demand data. Entrepreneur characteristics of cluster 1 were more reference to young entrepreneurs, with a range of age about 20-25 years.

The experience of the owners was in accordance with the establishment business which was about 4-6 months and has an average education of diploma degree.

This cluster was more oriented to the dynamics entrepreneurs who have fixed turnover and there was no business transition due to newly established businesses. Changes in the business principle of this cluster were quite influential on the business performance. The entrepreneurs in this cluster recognize that the business provides adequate of satisfaction to them and also the level of competition was considered quite high in their markets. These clusters were more inclined to the dynamics of the company since its main characteristic is the business can be considered young and still needs development so that changes occur, both the principle and the turnover rate remains stable and it was very competitive with its competitors.

While the cluster was not fully oriented to the classification of the performance management, but still serve as important points in business success. As the nature of leadership, it tends toward good planning and corporate performance affects to the business performance. The flow of information within the company was considered normal by both the employee and the manager or owner of the company. Service to customers and quality management were maintained in a fairly good condition. While the suitability of the worker and the amount of work was considered in standard situation, there was no shortage or surplus of employees in this cluster.

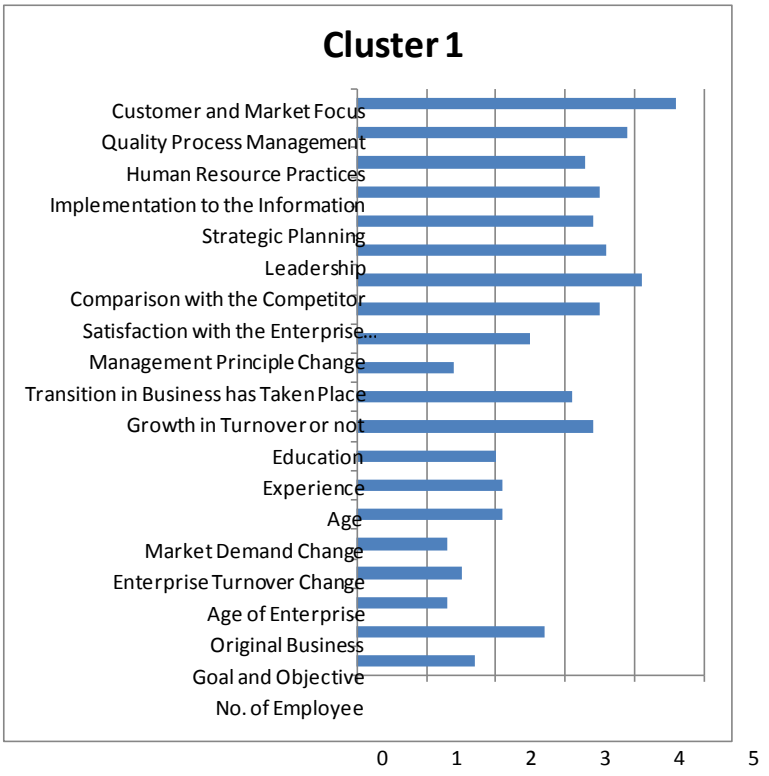

Fig 3. Bar charts representing the Mean Value of Each Variables of Cluster 1

5.2 Cluster 2

The number of members in this cluster consists of 27 SMEs. Cluster 2 has a characteristic that stands out

that the company had a large enough scale, it can be seen from a lot of number of employees. Characteristics of companies apart from the number of employees, it has a lot of business change which nearly reached 50% of the original business and longstanding company that was more than 1.5 years. The performance of the business is very influential on the purpose-designed as well as the changes of customer demand were very high, it was based on significant developments of the company.

If can be seen from the characteristics of entrepreneurs, this cluster was indeed a business that has long run by the entrepreneurs who have reached age over 30 years. With the entrepreneurs have experience of more than one year and have the education as high as bachelor degree or more, the business orientation not only on the entrepreneur dynamics but also on the performance management. Based on the dynamics of the entrepreneur, the business turnover increased, many experiencing transitions with an average of 2 times of transition, business principles are very influential on the performance of the business, the entrepreneur a normal course of business satisfaction while business competition is very high. This was most likely to be affected due to the success of this cluster that give rise to a very high competitors.

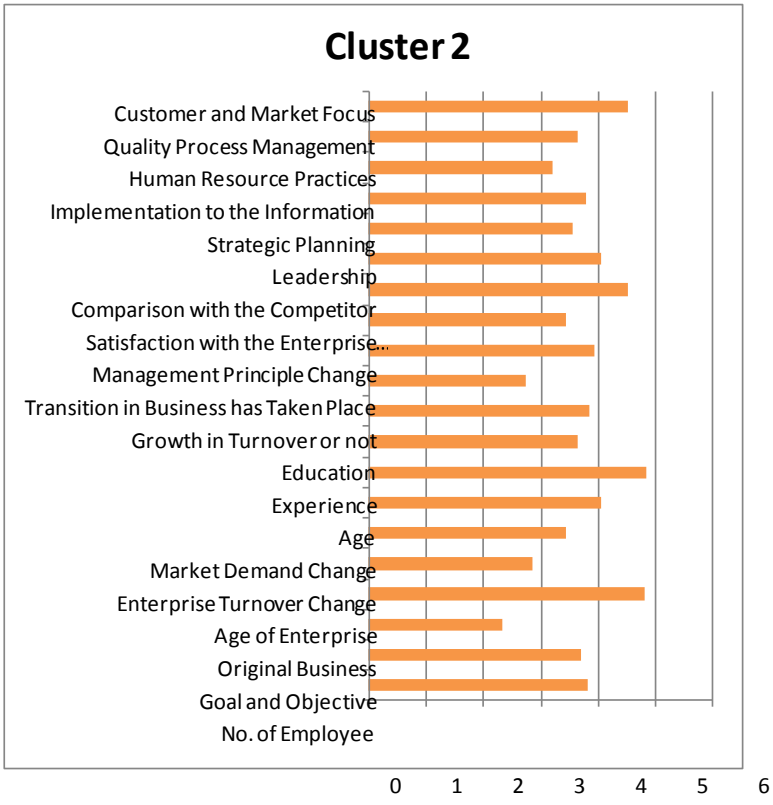

Fig 4. Bar charts representing the Mean Value of Each Variables of Cluster 2

Meanwhile, if viewed from the performance management, this cluster has the characteristics of good leadership, good planning for a mature performance so that it is affecting business performance. The flow of information in the ordinary course of business was considered in terms of the owner to the employees. The number of workers with sufficient number of suitable jobs and business management has a pretty good quality. It can be seen from the development of an excellent company, one of which was derived from the treatment of customers is very good.

5.3 Cluster 3

Cluster 3 was a cluster which has 25 members of SMEs. The most prominent characteristic of this cluster was a small business that has been running in a long time. The cluster was not really has orientation on entrepreneur dynamics and performance management, but the success of this cluster can be seen because it persisted for a long time and still run well.

Based on enterprise characteristics, the average business in this cluster has a bit of an employee which was about five employees, the performance was done enough at this time to affect the business's objectives, the changes in the business reaches 25% from the original business and it has been running for almost 1.5 years. The number of employees who resign from the business was quite a bit that around 1-2 employees from the beginning and also the customer demand changes in the standard scale.

The owners have an average age that has almost reached 30 years and their experience already had more than one year and an average education of them were diploma degree. Entrepreneur dynamics was not the orientation of this cluster, but tend to lack good standard. As with any turnover in this cluster tend to decline. The duration of the business was running in a long term, and then the transition of the business has reached about 1 time of transition, the changes principle of the business affect with a standard scale. In general, entrepreneurs are less satisfied with their business. This situation may be affected from high competitors.

The cluster was also not particularly oriented toward performance management, as well as leadership in this cluster are considered normal, performance planning was also quite influential on business performance, the flow of information was considered ordinary from the business owners to the employees. The number of workers and the number of jobs from the average result was not appropriate. There may be a shortage of employee or vice versa. Quality management system was quite good in this business and the treatment of customers was quite good. Business success can be seen from this cluster which each business that has lasted a long time, but in it has the disadvantage that many of the declines in turnover and a regular measurement of performance management.

5.4 Cluster 4

This cluster was a cluster that has the largest number of members which has 38 SMEs. The most prominent characteristic of this cluster was very oriented towards performance management. If it viewed from the enterprise characteristics, business in this cluster was still in the small scale. It consists of 5 employees with no change from the original business. The design of the activities was effect well on the goals of the business. Business in this cluster has also been carried out in a long time and the data requests from its customers have any changes.

The characteristics of entrepreneurs have an average age more than 30 years and have a very long experience of more than one year and also have an average education diploma degree. These clusters were less oriented to the entrepreneur dynamics. It can be seen from a fixed business turnover, there was no business transition. Principle that changes in this business affect sufficiently influence on business performance, the owners have the satisfaction of business in a standard situation. While the competition in business reach a fairly high number of competitors.

Performance management shows a fairly high value compared to other clusters. With the detail that the leadership felt pretty good in business planning, performance affects business performance. The flow of information on business was quite well and there were quite a number of workers according to the amount of work contained in the business. A quality management system in business was quite good and this cluster did very good treatment of customers.

6. Verification Analysis

To ensure proper clustering in this study, this analysis was conducted based on canonical discriminant analysis. The verifying of this study performed on 4 cluster and 20 variables. Discriminant analysis is used primarily to predict membership in two or more mutually exclusive groups. The table below will explain about the result of the eigenvalues and Wilk's Lambda discriminant analysis. The analysis revealed that the discriminant functions had eigenvalues of 44.413[a] with canonical correlations of 0.989. An eigenvalue indicates the proportion of variance explained. (Between-groups sums of squares divided by within-groups sums of squares). A large eigenvalue is associated with a strong function. From these values, the associated in this study are very strong. The canonical relation is a correlation between the discriminant scores and the levels of the dependent variable. A high correlation indicates a function that discriminates well. The present correlation of 0.989 was extremely high (1.00 is perfect).

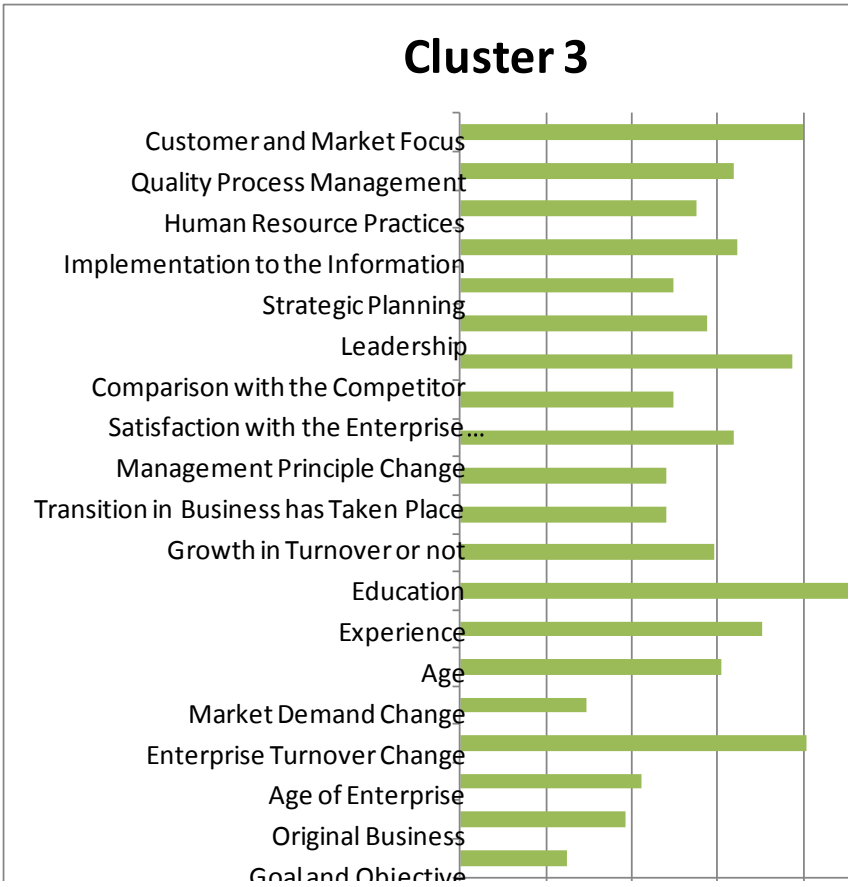

Fig 5. Bar charts representing the Mean Value of Each Variables of Cluster 3

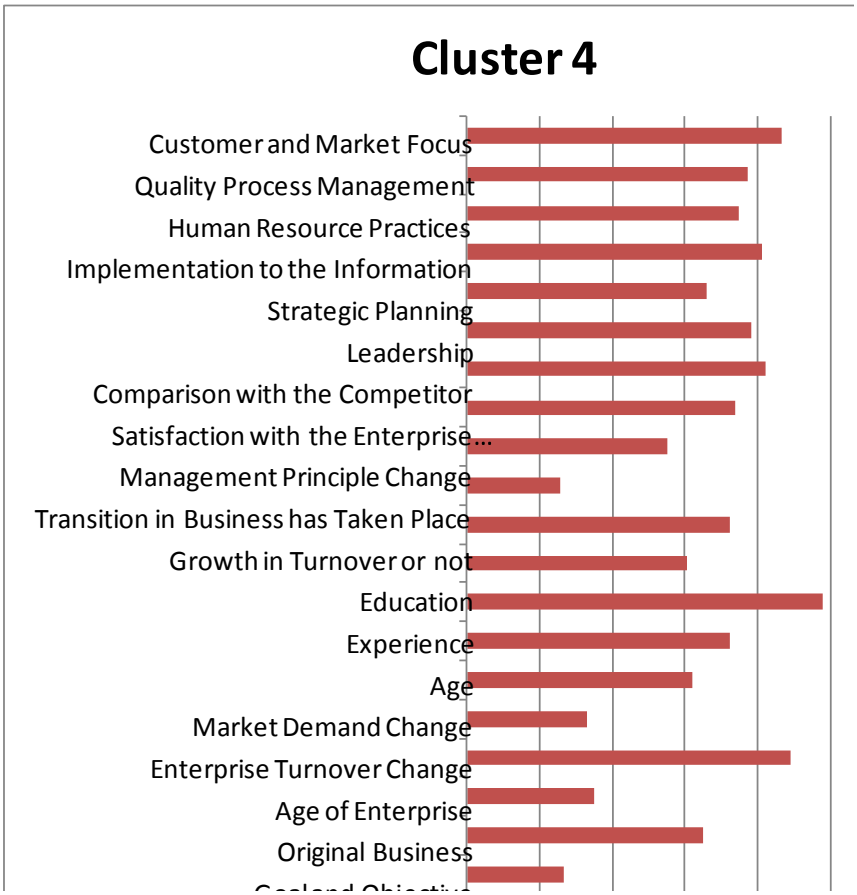

Fig 6. Bar charts representing the Mean Value of Each Variables of Cluster 4

Table 4. Eigenvalues and Wilk's Lambda Result for Discriminant Analysis

Eigenvalues				
Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	44.413[a]	100.0	100.0	.989
a. First 1 canonical discriminant functions were used in the analysis.				
Wilks' Lambda				
Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.022	95.395	20	.000

Wilks' Lambda is the ratio of within-groups sums of squares to the total sums of squares. This is the proportion of the total variance in the discriminant scores not explained by differences among groups. A lambda of 1.00 occurs when observed group means are equal (all the variance is explained by factors other those between difference than means), while a small lambda occurs when the within-groups variability is small

compared to the total variability. A small group of lambda indicates that means appear to differ. The associated significance values indicate whether the difference is significant. In this study, the value of Wilk's Lambda was 0.022 (Sig. 0000). The conclusion was in this study, the value of Wilk's Lambda at the very low position and indicates that the group means that appear to differ.

7. Conclusion

The research was conducted by obtaining information from the perspective of business owners that may have been the result of the response did not necessarily represent the concrete results in the field. It could be argued that the results of this study were not necessarily reliable for the desired result. This study was focused to successful independent SMEs to have a broad market in Indonesia.

The result was known that the number of clusters corresponding to successful independent SMEs was four clusters that have different characteristics from each other. Cluster 1 was more oriented to entrepreneurial dynamics, cluster 2 was more oriented to entrepreneurial dynamics and performance management, cluster 3 was not oriented to both of it, and success can be seen from a long standing and keep the business running smoothly, while cluster 4 was more oriented towards performance management.

For the further research is better by asking these variables not only to the owner of the business, but it can be ask to the 50% of the employees in that business. From these data, it will approach the desired results which will be valid and reliable. Moreover, it can be done similar research on SMEs with the further research could focus on one particular type of business.

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