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`INNOVATIVENESS SURVEY ON MANUFACTURING COMPANIES IN TASIKMALAYA CITY

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Abstract

Innovation is one of most important sources of competitive advantage. The purpose of this paper is to analyze innovativeness by using the 55 operations managers of manufacturing companies in Tasikmalaya City as respondents. The results showed the four types of clusters of Innovativeness consisting of (1) Leading Innovator that have the out class value than the others in every aspects of innovativeness, (2) Followers cluster is as the very low radical product innovations capability, (3) Inventors are very strong in radical product innovations, while (4) Lagers are at the lowest scores in all innovation types among the clusters. Based on ANOVA, it is concluded that every group of innovation type has its own success difference. The leading innovators type has the highest mean of business success measured by the comparison innovations type among groups in the growth of sales.

Keywords: Type of innovation, Innovativeness, Business success, Manufacturing companies.

Abstrak

Inovasi adalah salah satu sumber yang paling penting dari keunggulan kompetitif. Tujuan dari makalah ini adalah untuk menganalisis inovasi dengan menggunakan 55 operasi manajer perusahaan manufaktur di Kota Tasikmalaya sebagai responden. Hasil penelitian menunjukkan empat jenis kelompok Innovativeness yang terdiri dari (1) Innovator Terkemuka yang memiliki nilai kelas keluar dari yang lain dalam setiap aspek inovasi, (2) Pengikut cluster sebagai kemampuan inovasi produk radikal yang sangat rendah, (3) penemu sangat kuat dalam inovasi produk radikal, sedangkan (4) Lagers berada di skor terendah dalam semua jenis inovasi di antara cluster. Berdasarkan ANOVA, dapat disimpulkan bahwa setiap kelompok jenis inovasi memiliki perbedaan keberhasilannya sendiri. Jenis inovator terkemuka memiliki mean tertinggi kesuksesan bisnis diukur dengan jenis inovasi perbandingan antara kelompok-kelompok dalam pertumbuhan penjualan.

Kata kunci: Jenis inovasi, Innovatif, Keberhasilan bisnis, Perusahaan manufaktur

JEL Classification: M31

1. Research Background

Aggressive competition; which is characterized by the emergence of new companies and technological advances; makes business competition becoming increasingly global. The competition makes the companies under pressure and have to stay survive in the conditions ofdynamically change. The key to win the competition is innovation (Dhewanto *et al.*, 2014).

Innovation has been known as an important factor in improving the performance of the company in the face of dynamicmarket. As said by Drucker (1999), innovation is a necessity in the coping strategies. This is in line with Gupta and Mac Daniel (2002) that a company with a competitive advantage is the company that is capable of creating innovation and creativity through effective and plannedinnovation process.

In an organization, innovation begins with an intelligent individual who has the instinct to discover new needs, which then creates or improvises them into methods, processes, and new resources to meet the needs of the novelty (Malaviya dan Wadhwa, 2005).

Based on some researches, there are many taxonomic powers ofinnovation. Some researchers use the taxonomic of Gunday *et al*. (2012), which consists of four types of innovation power. They are Leading, Followers, Inventors and Laggers innovators. This article aims to measure the power of innovation to perform cluster analysis based on the taxonomy of Gunday *et al*. (2012), by taking manufacturing industries in Tasikmalaya as the objects.

Schumpeter (1934) is the first expert who puts forward the concept of innovation. He defines innovation as a new combination of factors of production which is created by entrepreneurs and an innovative thinking is an important driving force in economic growth.

In their initial literature review, Midgley and Dowling (1978) stated that most existing researches looked at the concept of innovation as the title of a person who adopts innovations relatively earlier than others do. Then, the concept of innovation is changing and other concepts are becoming more popular. For example, Hurley and Hult (1998) defines innovation as the idea of openness to new ideas as aspects of corporate culture and the proposed operation based on the input of innovation. That is the innovation measured by its predecessor.

On the other hand, Damanpour and Ewans (1984) state that innovation is realized after implementation of the new idea. In line with this statement, Damanpour (1991) defines innovation as the rate of adoption of innovation and shows that it is operated in many studies. The concept of innovation led to many innovative research-based innovation output (Ellonen *et al*, 2008; Tellis *et al*, 2009; Man, 2009), namely, innovation is measured by its innovations realized.

Innovation taxonomy by classifying companies according to their innovation is related to various types of innovation (i.e., products, processes, marketing, and organization). Avermaeta *et al*. (2004) is one of the first researchers to propose taxonomy of innovation, which is based on an empirical analysis of 177 small food companies from the UK, Belgium, and the Republic of Ireland. They concluded that the companies can be grouped into four categories: Non-Innovator, Traditional, Followers, and Leaders. Lehtoranta (2005) used the Finnish VTT Sfinno database to determine the type of SME innovation. In the taxonomic analysis of innovation based on the intensity of the proposed innovation, there are three groups of companies: innovators intensive, persistent innovators, and innovators with the innovation. Gunday *et al.* (2012),who used questionnaires distributed to the top managers of companies operating in six different manufacturing sectors (textiles, chemicals, metal products, machinery, household appliances and automotive industries) in the northern region of Marmara in Turkey, concludes that there are four taxonomic innovation: Leading, Followers, Inventors, and Lagers.

This study bases taxonomy of innovation in a research of Gunday *et al*. (2012), that there are four clusters of innovation in Tasikmalaya's manufacturing companies: Leading, Followers, Inventors, and Lagers.

2. Research Method

The method used is a survey method, a method that uses primary data collection by using questionnaires from selected samples (Zikmund, 2000; Sekaran, 2003). Judging from the goals, this research is intended to get a picture/description of the innovation clustersof the manufacturing industry in Tasikmalaya.

The object of research or often also called the unit of observation is something that will produce the characteristics/traits that would be a concern of researchers (Ahmad, 2003). Objects in this study consist of the types and clusters of innovation with the manufacturing industries in Tasikmalayaas the unit of analysis.

The samples in this study are all companies in the formal industrial manufacturing sector in Tasikmalaya. Based on the data in the *Kota Tasikmalaya dalam angka*, published by the Central Statistics Agency (BPS –*Biro PusatStatistik*) of the Tasikmalaya City until 2015, there are 55 companies, as mentioned in table 1 below.

Table 1. Formal Industry of 2015 in Tasikmalaya City

Nr.	Sub-Districts	Industrial Category				Total
		Crafts	Chemical & Buildings	Food and Beverages	Clothing and Leather	
1	Kawalu	27	1	-	-	28
2	Tamansari	1	1	2	-	4
3	Cibeureum	2	-	-	-	2
4	Purbaratu	-	-	-	-	-
5	Tawang	2	-	1	-	3
6	Cihideung	2	-	1	-	3
7	Mangkubumi	3	2	-	-	5
8	Indihiang	1	-	-	-	1
9	Bungursari	3	-	-	-	3
10	Cipedes	3	2	-	1	6
	TOTAL	44	6	4	1	55

Source: BPS Kota Tasikmalaya, 2015processed

Data collection methods used in this research is questionnaire, namely a structured questionnaire that is addressed and delivered directly to all managers/leaders of the company's top researchers to obtain data of the innovation variables to measure their innovation. The literature study is also conducted by studying the journals and reports from relevant agencies.

The analytical tools used in this study are as follow:

1. Descriptive Analysis: The analysis that is used to generate an overview of the data that has been collected based on the respondent's answer through the distribution of items.
2. Cluster Analysis: Cluster analysis is a technique to reduce the information. Information on the number of objects is reduced to a number of clusters, where the number of clusters is smaller than the number of objects. The same objects collected in a cluster that has a high degree of similarity in comparison with the objects of other clusters.

3. Analysis of Variance (ANOVA): After respondents are into their clusters, then test is done through ANOVA (Analysis of Variance) to know the difference. The procedure of analysis is One Way ANOVA or it is called Factor Design which is one of the ANOVA statistic units. This is to test whether more than two independence population has the average which is considered to be the same or difference. ANOVA tests the variability from each observed group and between Mean of group. By using these two variability, Mean of population can be concluded.

3. Result and Discussion

3.1. Descriptive Statistics Analysis

Companies that have participated in this study are manufacturing companies in Tasikmalaya City with 55 companies in total. Most companies that participated in this study have been in operation for 10-20 years (30.9%). Based on business sectors, most companies are engaged in crafts (80%). While the views of the ownership turn out that the whole company is owned by local businesspersons (100%). Based on the amount of labor and equipment held, there are 38 companies with a workforce of 20-99 workers, while 11 other companies have a workforce of more than 100 workers.

Based on descriptive statistical analysis as shown in Table 2, type of innovation that is most often carried out by companies in the manufacturing industries is Marketing Innovation with an emphasis on innovation promotion techniques.

Second frequent typeof innovation is the innovation process. This innovation is the innovation process that is often implemented in an industrial manufacturing companies that prioritize continuous improvement of production process by identifying activities that do not have add value as well as repair material suppliers that can produce higher quality results of output manufacturing.

The third is the type of incremental product innovation. This type of innovation is quite often done by manufacturing companies in the Tasikmalaya City. The type of incremental product innovation focuses on experimental activities in the innovation component or material that can lower the cost of production but can increase customer satisfaction.

The fourth is Organizational Innovation. It demonstratesthat organizational innovation is still quite rarely performed by companies manufacturing in the Tasikmalaya City. It shows that innovation organizational structure is very rarely done by most companies manufacturing industry in Tasikmalaya, they just do innovation at the level of coordination, human resource management, and innovation in enterprise information systems.

Table 2. Summary of Descriptive Statistics Analysis

Variable Innovation	Average
1. Product Radical Innovation	1.98
a. Developing new products with techniques and specifications that are totally different from the previous	1.11
b. Developing new products with components and materials that are totally different from the previous	2.85
2. ProductIncremental Innovation	3.37
a. Introducing innovations in components and materials of existing products to improve the quality of the product	3.05
b. Introducing innovation in superior products to improve ease of use of the product and improve customer satisfaction	3.65
c. Introducing innovation in product components and materials available to lower the cost of the product	3.40
3. Innovation Process	3.35
a. Determining and eliminating the activities in the production process that does not add value	3.50
b. Increasing the speed of delivery of logistics processes	3.40
c. Lowering the variable cost component in the production process	3.41
d. Improving delivery speed	3.44
e. Improving the quality of output in the production process	2.99
4. Innovation Marketing	4.25
a. Updating the distribution channel	3.99
b. Updating techniques of pricing	4.15
c. Updating promotion techniques	4.61
5. Organizational Innovation	3.05
a. Updating the organizational structure	1.95
b. Updating coordination system	3.15
c. Updating HR System	3.61
d. Updating the management of information system	3.48

Source: Data Processed, 2015

Innovation type that is still very rarely done by manufacturing companies in Tasikmalaya is the type of Product Radical Innovation. This indicates that there are only few of manufacturing industries in Tasikmalaya that have desire and interest to become a pioneer in creating a product that is completely new.

Cluster analysis in principle is used to reduce the data, explicitlythe process of summarizing a number of variables into fewer (into several clusters). Because the number of samples (data) was under the number of 100 respondents (55 respondents), this grouping used Hierarchical Clustering. Hierarchical clustering method used in this study is agglomerative procedure. It gave the result that all industries in Tasikmalaya City would be one group. In the agglomerativeprocedure, the method of Ward is used to form a cluster based on the total squared deviation of each observation from the average cluster members. In this case, the value of the sum of the square is the objective function at the time of incorporation.

Cluster analysis is done based on the object, in order to classify the respondents.Inthis case, the respondents are the manufacturing companies in Tasikmalaya. They are classified into several groups according to the total number of respondents. It is based on similar characteristics of the industries. Grouping occurred one by one, starting from the most similar characteristics. That is, the manufacturing companies, which have similarities in innovation where most similar

will form one group, while the manufacturing industriesthat have many differences will form other groups.

Based on cluster analysis using the Hierarchical Clustering and using procedures agglomerative (Ward's method) resulted in four (4) clusters, which in Cluster 1 (Leading Innovators) consists of 4 companies and Cluster 2 (Followers), consisting of 28 companies, Cluster 3 (Inventors) consists of 6 companies whereas Cluster 4 (Lagers) consists of 17 companies.

Table 3. Cluster Analysis Result Recapitulation

Cluster	Respondent	Total
Cluster 1 *(Leading Inovator)*	6, 14, 35, 37	4
Cluster 2 *(Followers)*	1, 4, 5, 7, 10, 15, 17, 18, 19, 20, 22, 25, 29, 30, 34, 36, 39, 40, 41, 42, 43, 45, 46, 47, 50, 51, 52, 55	28
Cluster 3 *(Inventors)*	2, 3, 31, 38, 44, 54	6
Cluster 4 *(Lagers)*	8, 9, 11, 12, 13, 16, 21, 23, 24, 26, 27, 28, 32, 33, 48, 49, 53	17
	Total	55

Source :The recap is from dendogram based on Wards method to analyze

ANOVA tests the variability from each observed group and between Mean of group. By these two populations, the Mean of population can be concluded. The aim of this analysis in this research is to know whether there is the difference of business success between clusters of manufactures in Tasikmalaya City.

The types of innovation group formed based on cluster analysis of manufactures are leading innovators, followers, inventors, and lagers. In addition, the business success is measured by using the survival business level, employment growth, and sales growth.

The basic assumption from ANOVA is that all formed groups must have the same variance. To test this assumption, it can be noticed from the homogeneity test of variance by using Levene Statistics. The hypotheses used in homogeneity test variance are:

Ho : the four variance are the same

Hi : the four variance are different

The foundations of these are:

If probability> 0.05, H0 is accepted

If probability< 0.05, H0 is rejected

Variance Homogeneity Test is done to test the business success where there are three level points to measure. They are business survival, employment growth, and sales growth. To these three level points, variance homogeneity test is used to measure this success. The following table shows this description.

Table 4. Variance Homogeneity Test of Business Success

No	Business Success	Levine Statistic	Significance	Decision
1	Business Survival	7.033	0.000	Rejected
2	Employment growth	4.004	0.001	Rejected
3	Sales growth	1.633	0131	Accepted

Source :analyzed data, 2015

Based on variance homogeneity test, in fact, the level of business success is based on sales growth fulfilling the basic assumption of ANOVA calculation where the four variancesmust be the same. The hypotheses used in ANOVA test are:
Ho : the four innovation groups have the same average sales growth
Hi : the four innovation groups have the different average sales growth.
The foundations of the decision are:
If F sum> F table 0.05, H0 rejected
If F sum< F table 0.05, H0 accepted

From the result of ANOVA to the sales growth, F sum is 9.401 by the significance 0.000 and F table is 3.55. Therefore, H0 is rejected and H1 is accepted. This result indicates that the average of sales growth from the four types of strategies is significantly different.

From ANOVA (F test), generally, it has been known that the four types of innovations have the difference in the business success (sales growth).To know this difference, it needs Post Hoc Test by using one of Tukey functions. The used hypotheses are:
Ho : Both groups have the same sales growth average.
Hi : Both groups have the different sales growth average.

The determination of this test is:
If probability > 0.05, H0 is accepted
If probability < 0.05, H0 is rejected

Based on Post Hoc Test output, it can be seen the difference between two groups, as follows. The probability score of the difference between leading innovators and followers types is 0.000. Therefore, the probability is 0.000> 0.05, than H0: is rejected. This means that the average of sales growth between leading innovators and followers types is significantly different. The probability score of the difference betweenleading innovators and inventorstypes is 0.122. The probability is 0.122< 0.05, therefore, H0: is accepted. This means that the sales growth average between leading innovator and inventors' strategy types are significantly the same. The probability score of the difference between leading innovators andlagerstype is 0.001. The probability is 0.001> 0.05, therefore, H0: is rejected. This means that the sales growth average betweenleading innovator and is significantly different. The probability score of the difference between followers and inventors types is 0.000. The probability is 0.000 < 0.05, therefore, H0: is rejected. This means that the sales growth average between followers and inventors types is significantly different. The probability score of the difference between followers and lagerstypes is 0.092. The probability is 0.092> 0.05, therefore, H0: is accepted. This means that the sales growth average between followers and lagers types is significantly the same. The probability score of the difference between inventors and lagers is 0.000. The probability is 0.000 < 0.05, therefore, H0: is rejected. This means that the sales growth average between inventors and lagers is significantly different. Based on Post Hoc Test description,the recapitulation of it is as follows in table 5.

Table 5. The Post Hoc Test Result Recapitulation of Sales Growth

No	Difference between Groups	Decision
1	Leading innovators - Followers	Difference
2	Leading innovators - Inventors	No Difference
3	Leading innovators - Lagers	Difference
4	Followers - Inventors	Difference
5	Followers - Lagers	No Difference
6	Inventors - Lagers	Difference

Source :analysed data , 2015

3.2. Discussion

From the result of cluster analyses, there are four types innovation groups. The first cluster, Cluster 1, is leading innovators. This involves four respondents. The second is Cluster 2. These followers involve 28 respondents. The third is Cluster 3. It is the inventortypes which involves 6 respondents. The last cluster is Cluster 4. It is lagers which involve 17 respondents.

Leading Innovators is a cluster of companies that have an average score for all aspects of this type of innovation is high. Companies that are in this cluster more often implement radical innovation on the type of product innovation and process innovation so prolific in producing products that are truly innovative. A small number of manufacturing industries in Tasikmalaya are in this cluster. It shows a low power innovation.

Mostof the manufacturing industries in Tasikmalaya are in followers cluster category. The cluster of followers show low product radical innovation. Followers prefer the type of incremental product innovation. Theyalso do a quite strong organizational innovation.

Inventors have the better power of innovation than the lagers but still lower than the leading innovators. If the leading innovators do almost all types of innovation, the inventors very implement the type of product radical innovation. This cluster is also very much appreciated by the cluster of followers because they will immediately do the process innovation to be able to improvise from potential new product innovations result from the cluster inventors.

Lagers are the lowest cluster in the power of innovation. It has the smallest scores compared to three other types of innovation. Cluster of lagers rarely implements the new product innovations. It only imitates products. The companies are already comfortable with the existing conditions and feel that innovation requires a large investment fund with the results that do not necessarily provide a great advantage for them.

Based on the discussion above, the competitiveness of the manufacturing industries in Tasikmalaya is still relatively low. This is confirmed by many manufacturing companies that are considered applying the clustersof followers and lagers.

One-Way method of ANNOVA is used to differ the business success among the four innovation types. The measurement of business success uses the survival level, employment growth, and sales growth. From the One-Way ANOVA analyses, the business survival and employment growth for homogeneity test variance has the probability level < 0.05. It means that both of success measurement have no the same variance. Therefore, this does not fulfill the basic assumption of the test by using ANOVA where all groups must have the same variance. By this reason, survival level and employment growth cannot be used to testthe difference of each group.

However, the homogeneity test of sales growth from One-Way ANNOVA has the probability score > 0.05. This means that the success measurement by using the sales growth of all groups has the same variance which can be usedto test the difference of each group. To know the means difference of each group, Post Hoc Test is used.

Based on Post Hoc Test result, there is no significant difference correlation between leading innovators and inventorgroup types, and between followers and lagers. As the comparison, there is a significantdifference in the correlation of leading innovators and followers, leading innovators and lagers, inventors and followers, and between inventors and lagers.

The means plot diagram and descriptive tableof sales growth show that the manufacture in Tasikmalaya City which has leading innovators types, has the highest means that the other three types. It is followed by inventor type, followers, and lager which has the lowest means. These indicate that the leading innovators type has the highest business success to the sales growth compared to the other types.

4. Conclusion

Based on the results of the cluster analysis of the manufacturing industry in Tasikmalaya, there are four clusters of innovationcompetitiveness: leading innovators, followers, inventors, and lagers. Most industries are followers and lagers. This shows that the power of innovation in the manufacturing industry is still low.

From the result of ANNOVA, each type of formed innovation groups has the difference business success. In this point, leading innovators has the highest business success average. This is measured by the sales growth compared the three other groups.

The results of this study can be used as a basis to conduct research in the future by connecting several relevant variables, such as the choice of strategy associated with the operation or performance of the company.

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