Student Entrepreneurship Cluster as The Implementation Response of University Entrepreneurship Program (A Case Study of Engineering Faculty Students of Unhasy Tebuireng)

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Abstract
This research was carried out to identify the characteristics of entrepreneurship carried out by students of the engineering faculty of Unhasy. The elements of cluster grouping are based on the entrepreneurial activities before becoming a student of the engineering faculty. This is to identify whether the activities have changed or not in terms of continued entrepreneurship after becoming a student at Unhasy. The processing of the data obtained shows that the program Entrepreneurship in the engineering faculty is identified based on: the alignment of the entrepreneurship program of Unhasy with implementation, the implementation of entrepreneurial practices, the entrepreneurship infrastructure that they have and want, the way to learn entrepreneurship, and the response to implementation of the Unhasy entrepreneurship program. From these variables, it shows in general that students of Unhasy's engineering faculty has been running entrepreneurship and survived until now at around 39%.

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Keywords: characteristics, entrepreneurship, engineering students, cluster, Unhasy

Introduction

The structure of the entrepreneurship course at universities usually provides a basic understanding of entrepreneurial skills to students. Through this course, students can apply the theory and values of entrepreneurship that can be applied in real life through practice, integrated both inside the courses and outside the course or extracurricular activities. Therefore, universities in Indonesia announced that Entrepreneurship program as a content in education curriculum is expected to encourage students to be creative and independent, and even start to move and brave to open their own business. As developing university, many things must be evaluated in its development, moreover the activity of entrepreneurship by Unhasy student. In its development, Unhasy students from Tebuireng have been provided the entrepreneurial learning. However, the feedback or the measure of success that has been carried out has not been able to measured as the achievement of the program declare. Seeing this phenomenon, the researcher need to conduct some basic research studies related to entrepreneurship. Students as the first input of study entrepreneurship is the prime mover of Unhasy entrepreneurship. The unknown problem of Unhasy student entrepreneurship will affect the development of the entrepreneurship learning that was proclaimed at a university. As a foundation development, the research on entrepreneurial mapping carried out for students will provide learning management considerations entrepreneurship of the engineering faculty of Unhasy. By doing this research, we will know the entrepreneurial factors that occur in University especially Engineering faculty student before they are accepted.
Entrepreneurial behavior is everything pattern of economic and business activities characterized by entrepreneurial elements namely innovation, leadership, accumulation capital, managerial and courage taking the risk. Education, experience business, motivation, and business location give influence to the entrepreneurial behavior (Yuliadini 2000).

Wijand in Setiawan (2003) argued that entrepreneurial behavior are knowledge, mental attitude, and skills and alertness is a combination of elements of knowledge and mental attitude towards the future. According to Lunandi in Ramanti (2006), a person's behavior is influenced by attitudes, knowledge, and skills that owned and in certain cases by available materials. Therefore, the process adult human learning towards change behavior should be driven through effort new attitude change, giving him new knowledge, and in some cases accompanied by the provision of new materials.

Atmakusuma in Setiawan (2003), defined knowledge as the level of one's thinking ability. In general, the ability to think is more determined by the level of good education both formal or informal. However, there is no direct relationship between knowledge or education with an entrepreneurial spirit. In carrying out the business, an entrepreneurs need to have some adequate basic knowledge so that his efforts were successful. Someone’s knowledge will grow along with advances in time and technology. As a business man, up-to-date knowledge must be obtained and followed for the business progress.

Pambudy (1999) described basic attitudes of an entrepreneur is a strong will, ability and opportunity to always pay attention to his business. The skill that must have is a will, ability and the opportunity to always use all organs physically in developing his business. This element is related to work physical such as the hands, feet, and mouth (voice) to work.

According to Porter (1998), cluster is a group of companies and nearby related institutions geographically, having a strong resemblance encourage competition as well as complementary. Meanwhile, according to Tatang (2008) an industrial cluster is a collection, group, set, or combination of objects certain things that have a resemblance to or above certain basic characteristics. In economic/business context, industrial cluster is a terminology which has a specific meaning. Next is according to the Ministry of Industry and Trade, industrial clusters is an industry group with a focal/core interconnected industries intensive and form a partnership, good with supporting industry and related industry.

The cluster analysis of clustering procedure classification is shown in the chart below (Simamora, 2005):

Fig 1. Clustering Hierarchy
**a. Proximity Measure.**

The measure of proximity used is a measure of dissimilarity/a measure of Euclidean distance that is calculated by the following equation:

\[
d_{ik} = \sqrt{\sum_{j=1}^{p} (X_{ij} - X_{kj})^2}
\]

Where:

- \(X_{ij}\) = object -i on variable -j
- \(X_{kj}\) = object -k on variable -j
- \(i, k = 1, 2, \ldots, n; i \neq k\)
- \(J = 1, 2, \ldots, p\)
- \(p = \text{number of variables}\)

**b. Cluster Validity Test**

Cluster validity test is needed to see goodness or quality of cluster analysis result. The measure used to test the validity of the results clustering in this study is the coefficient cophenetic correlation. It is the correlation coefficient between the original elements of the matrix dissimilarity (Euclidean distance matrix) and elements generated by dendrogram (cophenetic matrix) (Silva & Dias, 2013). The formula used to calculate the cophenetic correlation coefficient is as follows:

\[
r_{coph} = \frac{\sum_{i<k}(d_{ik} - \bar{d})(d_{ik} c - \bar{d} c)}{\sqrt{\sum_{i<k}(d_{ik} - \bar{d})^2} \times \sqrt{\sum_{i<k}(d_{ik} c - \bar{d} c)^2}}
\]

Where:

- \(r_{coph}\) = cophenetic correlation coefficient
- \(d_{ik}\) = real distance (Euclidean distance) between object i and k
- \(\bar{d}\) = average \(d_{ik}\)
- \(d_{ik} c\) = cophenetic distance object i dan k
- \(\bar{d} c\) = average of \(d_{ik} c\)

The value of \(r_{coph}\) ranges between -1 and 1; \(r_{coph}\) value close to 1 means the solution resulting from clustering process is quite good. (Alfi Fadliana and Fachrur Rozi, 2015).

**Research methods.**

The population that will be used is engineering student of Unhasy Tebuireng Jombang with period class of 2019-2016 where in the faculty, there are industrial engineering department, Mechanical engineering department, Civil engineering department, Electrical engineering department. The following will describe the research flow conducted by researchers.

![Flowchart](image)

Fig 2. The flow of Response research methodology of Engineering student entrepreneurship in Unhasy.

In carrying out this research, the researcher divides into 4 steps in sequencing the research. This is to improve the research process that will be carried out. The following is the explanation of the steps carried out by researchers:
a. **Step 1**

This is the stage of problem identification and problem formulation that will be raised. The components included in this phase are:

- Field Studies
- Library Studies
- Problem Identification
- Problem Formulation
- Determining the research ideas

b. **Step 2**

This is the step of research operation 1. The components included in this phase are:

- Compiling questionnaires
- Determining the respondent
- Determining the sampling size
- Sampling method

c. **Step 3**

This is the step of research operation 2. The components included in this phase are:

- Data processing
- Entrepreneurial behavior of engineering students
- Students’ profile of doing entrepreneurship.
- Cluster analysis
- Data analysis
- Interpreting the data processed

d. **Step 4**

This is the step of final research operation. The components included in this phase are:

- Conclusion
- Suggestion

The research setting was in Engineering faculty of Hasyim Asyārī University.

<table>
<thead>
<tr>
<th>Variable</th>
<th>What is measured</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>students</strong></td>
<td>Origin, Gender, Age, high school major</td>
</tr>
<tr>
<td><strong>Entrepreneur types</strong></td>
<td>Origin, Gender, Age, Number of products, Supplier/business owner, Startup capital, level of education</td>
</tr>
<tr>
<td><strong>Business Product</strong></td>
<td>Selling products, service products, product origin</td>
</tr>
<tr>
<td><strong>Startup capital used</strong></td>
<td>Borrow banking, borrow from parents, work alone</td>
</tr>
<tr>
<td><strong>Department at the Engineering Faculty of Unhasy</strong></td>
<td>Industrial Engineering, Civil Engineering, Mechanical Engineering, Electrical Engineering</td>
</tr>
</tbody>
</table>

**Finding and Discussion.**

In this study, the researcher used SPSS software as a tool in processing data obtained in the field. Pit used K-Means Cluster or non-hierarchical method. Reasons for choosing K-Means analysis.

The following is the data description of the Student Respondents of the Faculty of Engineering Unhasy which was collected by the researcher.
Table 2. The description of data collection

<table>
<thead>
<tr>
<th>P1_School background before entering FTK-Unhasy</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMK</td>
<td>63</td>
<td>56.3%</td>
</tr>
<tr>
<td>SMU</td>
<td>27</td>
<td>24.1%</td>
</tr>
<tr>
<td>MA</td>
<td>19</td>
<td>17.0%</td>
</tr>
<tr>
<td>Paket C</td>
<td>3</td>
<td>2.7%</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P2_gender</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>97</td>
<td>86.6%</td>
</tr>
<tr>
<td>Women</td>
<td>15</td>
<td>13.4%</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P3_department</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>69</td>
<td>61.6%</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>18</td>
<td>16.1%</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>20</td>
<td>17.9%</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>5</td>
<td>4.5%</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P4_year of edication</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>1</td>
<td>.9%</td>
</tr>
<tr>
<td>2016</td>
<td>21</td>
<td>18.8%</td>
</tr>
<tr>
<td>2017</td>
<td>26</td>
<td>23.2%</td>
</tr>
<tr>
<td>2018</td>
<td>24</td>
<td>21.4%</td>
</tr>
<tr>
<td>2019</td>
<td>40</td>
<td>35.7%</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P5_semester</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>35.7%</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
<td>21.4%</td>
</tr>
<tr>
<td>5</td>
<td>28</td>
<td>25.0%</td>
</tr>
<tr>
<td>7</td>
<td>19</td>
<td>17.0%</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>.9%</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
The selection of the most appropriate number of student clusters is done by comparing the value of the ratio between the within-cluster variance to the between-cluster variance. The value of the variance within cluster and the variance between cluster, obtained from the calculation with the following formula.

\[ V_c^2 = \frac{1}{(n_c-1)} \sum_{i=1}^{n_c} (d_i - \overline{d}_c)^2 \]

where \( V_c^2 \) is the variance value of each clusters that are formed.

\[ V_w^2 = \frac{1}{(N-k)} \sum_{i=1}^{k} (n_i - 1) + V_c^2 \]

where \( V_w^2 \) is the value of the variance within the cluster that is formed.

\[ V_b^2 = \frac{1}{(k-1)} \sum_{c=1}^{k} \frac{n_c}{n} * (\overline{d}_c - \overline{d})^2 \]

where \( V_b^2 \) is the value of the variance between among the clusters formed.

\[ V^2 = \frac{V_w^2}{V_b^2} \]

Is the ratio value between variance within and variance between.

Explanation:

- \( n_c \) is the number of data in a cluster.
- \( d_i \) is the distance value of a data to the centroid data.
- \( \overline{d}_c \) is the average value of the distance of a cluster.
- \( d \) is the average value of the distance from all data.
- \( k \) is the number of clusters.
- \( N \) is the total number of data.

The most appropriate criteria for a number of clusters is if the number of clusters has the smallest comparison ratio value (\( V^2 \)). The following table is the results from the ratio value comparison of the
variance cluster for Students based on entrepreneurship.

Table 3. The comparison between value of rasio varians within and between

<table>
<thead>
<tr>
<th>Total Cluster</th>
<th>Varians within (V²w)</th>
<th>Varians between (V²b)</th>
<th>Varians (V²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.610</td>
<td>16.722</td>
<td>0.036</td>
</tr>
<tr>
<td>3</td>
<td><strong>1,073</strong></td>
<td><strong>238,061</strong></td>
<td><strong>0.005</strong></td>
</tr>
<tr>
<td>4</td>
<td>25.995</td>
<td>6.171</td>
<td>4.213</td>
</tr>
<tr>
<td>5</td>
<td>69.654</td>
<td>9.762</td>
<td>7.135</td>
</tr>
</tbody>
</table>

Based on the table, it is known that the smallest variance value is in 3 clusters, so the most appropriate number of clusters for grouping engineering faculty students based on entrepreneurship is 3 clusters. Based on entrepreneurship, there were 3 groups of students’clusters from the Faculty of Engineering Unhasy, where each group contains respondents with the following frequencies and percentages.

Table 4. Teknik the total number of frequencies and percentages of students’ clusters from the Faculty of Engineering Unhasy based on entrepreneurship.

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>44,000</td>
<td>39%</td>
</tr>
<tr>
<td>2</td>
<td>13,000</td>
<td>12%</td>
</tr>
<tr>
<td>3</td>
<td>55,000</td>
<td>49%</td>
</tr>
</tbody>
</table>

Based on the table above, it is known that cluster 1 contains students from the Engineering Faculty of Unhasy with a total of 39%. While cluster 2 contains engineering faculty students as much as 12% then cluster 3 contains 49% students. The grouping of students into the 3 clusters above is based on differences in the variables of the entrepreneurial cluster, where there are 25 variables used to group students. Differences in cluster variables between cluster 1 and cluster 2 and cluster 3 are known from the ANOVA test, namely by looking at the value of Sig. The criteria used are if the value of Sig. < the error tolerance level (α) = 5%, it is concluded that there is a significant difference significant among the clusters, and vice versa.

Table 5. Anova

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>25.0</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>20.0</td>
<td>3.5</td>
<td></td>
</tr>
</tbody>
</table>

Clustr profile 1. (students who are already running entrepreneurship). It is explained by the following table:

Based on the value of Sig. in the table above, it is concluded from the 25 KWU cluster variables, there are 2 cluster variables that are not significantly different. It means that the two variables are equally owned by cluster 1, 2 and cluster 3, or in other words that the two cluster variables are unable to distinguish between groups 1, 2 and group 3. The two cluster variables are P10_Semester_Matkul_KWU and P16_Kegiatan_mentoring_KWU_diluar_mak tul. While the remaining, 23 KWU variables have different characteristic values between cluster 1, 2 and cluster 2.
Conclusion and Suggestion

It was concluded that entrepreneurial activities at Hasyim As'ari University, especially in the Faculty of Engineering, were characterized by 39% of qualified students who were engaged in entrepreneurship which started business before becoming a student. The suitability between entrepreneurship courses and entrepreneurship lecture activities from data processing cluster 2 inhabited by Engineering students who are not yet become entrepreneurs indicates that they do not know the suitability of the entrepreneurial program launched by the University, as many as 77% do not know the function of entrepreneurship. So the suggestions that can be taken from the description of the cluster data obtained. It is better to evaluate the objectives and entrepreneurial materials that are carried out by the university.

Daftar Referensi.


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