Ethnoscience Approach in Cooperative Academic Education Programs (COOP)

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Abstract. Cooperative Academic Education Programs (COOP) is an Integrated Work Learning Program between universities represented by students and lecturers with the world of work through a model of assistance in solving the problems faced by UMKM. This research was conducted to integrate the approach of ethnoscience on COOP program at UMKM that is Carica Fruit Production, Business of Fried Chicken and Opak Cassava Production. Research method using an experimental method. With data collection techniques consist of observation, documentation and literature study. The results of the achievement program are creative solutions to develop UMKM: 1) UMKM engaged in the home-based industry that produces fast food show that the intensity of cooking oil usage affects oil viscosity value. The more the amount of usage the viscosity of oil will decrease. The results of this study occurred in the two brands of oil, 2) The manufacture of cassava opak can be studied using the principle of expansion. The expansion process occurs during the drying and frying process. The main factor affecting the occurrence of expansion is temperature, 3) Carica leather waste treatment can be analyzed through strain process on the sap, electrostatic process on the separation of particles, an isobaric process in leachate water container.

1. Introduction

Cooperative Academic Education Programme (COOP) is PBBT between university which is represented by student and lecture, and working world by giving a guidance to solve any problems faced by micro industry (UMKM). This research is conducted to integrate ethnoscience approach toward COOP program in a micro-industry fried chicken, opak, and Carica production [9] ethnoscience examines the knowledge system from a culture where it is located. Teaching method using the cultural concept as the resource is able to increase the students’ capability to understand science. This research tries to disclose science concept in micro industry activity. This activity will transform genuine science (developing knowledge in society) into scientific science or genuine knowledge such as traditional ecology knowledge, traditional knowledge, and genuine science [5].
This program is conducted by teaching, guidance, guiding, and monitoring them to push the student in order that they have better confidence as a remarkable entrepreneur. It is made based on the intention that those who graduate from Universitas Sains Al-Qur'an (UNSIQ) don’t only have hard skill but also an outstanding soft skill [7]. Entrepreneurship is a part of the interpersonal skill, according to [6] entrepreneurship is a courage, attitude, behavior, and capability for someone who wants to have their own business. It gives influence toward the effort to create a new product and a new technology in order that the service is much more efficient and better in order to gain much more profit.

This statement is also supported by [14],[12] arguing that entrepreneurship is a strong willingness to create something new and make something different in order to create individual prosperity and give more value to society. Entrepreneurship indicator is required to determine whether the program succeeds or not. The practitioner needs to be more concrete to prepare the program and teaching activities to push the spirit of entrepreneurship from elementary to college [14]. This attitude is also influenced by perception toward environments like the natural resource, motivation to work, and teaching quality [12].

COOP program UNSIQ 2016 has several purposes: Increasing young entrepreneurs, quality and relevance, UMKM, and network between university and industry. Meanwhile, a small industry which can be explained using ethnoscience approach.

| No | Small Industry | Industry | Product | Ethnoscience Approach |
|----|----------------|----------|---------|-----------------------|
| 1  | Waroeng Jovan  | Trade    | Food and fried fish | Fluid viscosity analysis in oil |
| 2  | Ok-Klez By SR dan Opak 2 Merpati | Trade    | Cassava opak | Applying Expansion concept toward Cassava opak |
| 3  | Mutiara Food, Yuasa Food dan Frescha Carica | Home industry | Special drink made from Carica | Carica waste utilization as liquid organic compost |

2. Research Method

The method used to COOP program 2016 cooperated between UNSIQ and directorate general of learning and student affairs is an experimental method. It is due to take production sample. Meanwhile, techniques used to obtain data are as follow: Observation which is required for the research like the use of carica waste, cassava opak expansion, and a fluid thickness in cooking oil. Then, Documentation from the beginning till the end using a digital camera. And Literature Study is studied several references to book, report, researchers, and relevant journals.

3. Result

3.1. Thickness of cooking oil in fried chicken small industry

The thickness of cooking oil is found by obtaining various data in terms of the use of the oil; the use 0/ not used yet, once, twice, three times, and also the use of various type of oil A and B brand. The activity ata small industry in the frying process three times with the same temperature and frying time of approximately 6 minutes, by comparing the frequency of cooking oil consumption to the value of consistency (absolute viscosity) on each its. The result is the relationship between the intensity of cooking oil consumption to the absolute viscosity of each brand of cooking oil is shown in picture1 as follow:
3.2. Concept of Expansion at Small Industry Cassava Opak

It is found that there is a concept of expansion while making cassava opak, which starts from drying till frying opak. Figures 1 shows opak expansion level with several selected samples randomly on each dough. The number of samples used is 10 pieces on 3 types of dough. The result is shown in Figures 2 and 3.
Visualization of cassava opak production activity in small industry Ok Klez by SR and Opak 2 Merpati can be shown from the figures 4.

Figures 4. Cassava opak production activity in small industry

3.3. Carica Skin Waste Management at Carica Small Industry

In terms of sanitation, during 2 (two) months trial to obtain compost from carica skin. So it is thrown away. I can be useful for other plants. The tools and materials required to manage the waste of carica are:

Tools and materials: A 5-liter jar and two jar 2-liter jars; Plastic pipe and Carica skin.

Steps: Cut the carica skin in small pieces; Spray it using laktomayonas an activator, but it should be far away from sunshine; insert to container which has been already designed with filtration media; and wait till water coming out; Water coming out from the container is called leachate. It can be used as fertilizer and In addition, dregs can be used directly and Leachate has to be fermented first and it has to be opened everyday to reduce the gas containing in the water.

Figures 5. The process of making Cassava Opak

4. Discussion

4.1. Thickness of cooking oil at UMKM Fried Chicken

Cooking oil is a fluid substance which has an important role for the process of frying chicken in UMKM Warung Jovan. In addition, the use of cooking oil repeatedly will determine the concentration of the solution. By analysis of viscosity of frying oil (viscosity) is measured that states the viscosity of a liquid or fluid to flow under the influence of shear stress [11]. Oil quality parameters on physical properties include color, odor, solubility, liquid point and polymorphism, boiling point, softening point, slipping point, shot melting point; type weight, viscosity, refractive index, turbidity point, smoke point, flash point and hotspot [12]. The equations used to determine viscosity [11] is:

\[ \eta = \left( 0.0026 t - \frac{1.175}{t} \right) - (\rho_{ninyak} - \rho_{udara}) \ldots \ldots \ldots \ldots \ldots \]

Note: absolute viscosity (poise) and t: time (second)
From the result of the research (figures 1) shows that the use of cooking oil for 3 times has a different degree of viscosity. [4] argue that oil absorption will increase when it is used more repeatedly because of its role as conductor. The smallest viscosity of the cooking oil is cooking oil that has been used three times, and the greatest viscosity is cooking oil which is not used yet. In a liquid, the viscosity is caused by a cohesive force. It is an attraction between similar molecules. Based on the linearity graph, it is clearly known that the more frequent cooking oil is used, the viscosity is getting lower (absolute viscosity).

Cooking oil that has been used three times has the lowest viscosity according to figures 1. It is due to the fact that cooking oil has been warmed so that the bond between the molecules decreases and it causes the oil density decrease [1] Cooking oil used for several times will not be good for the user, especially UMKM Warung Jovan visitors to enjoy the menu of fried chicken. The taste and health must be considered. According to research conducted [2], it is shown that cooking oil should not be used repeatedly because hydrolysis oxidation, pyrolysis, and decomposition of cooking oil occurs. Therefore, the UMKM should consider using cooking oil no more than three times. Besides, type and brand of cooking oil used have to be considered as well. Based on figures 1.

4.2. Concept of Expansion at Cassava Opak UMKM

Cassava opak production begins with peeling, processing, drying, and separation of dried opak. The shape changes, In physic concept is called expansion. The change of size occurs during drying. Next, it can be expanded when opak has been fried. At the first time, the object with size \( A_0 \) will be heated so that the temperature increases by \( \Delta t \) and it will be wider \( \Delta A \), in causes \( \beta \) is expansion coefficient of object and \( \Delta t \) is increasing of temperature based on the following equation:

\[
A_1 = A_0 (1 + \beta \cdot \Delta t) \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldotted{...}
Electrostatic process on leachate filtration media based on figures 5, it shows that electrostatic process is an attraction between two different things which occurs in the filtration inside of leachate media. Theoretically, the filtration power is also proportional to the pressure difference. In this case, the density of Carica leather in solid form will be held above the filter while the liquid leather carica form of liquid will come down to the bottom called water leachate. Its is formed from the decomposition process of waste due to microbial activity that turns it into a simpler organic form. According to Tchobanoglous in [3] leachate contains many elements needed by plants, including organic Nitrogen (10-600 mg/l), Ammonium Nitrogen (10-800 mg/l), Nitrate (5-40 mg/l), Total Phosphorus (1-70 mg/l), Total Iron (50-600 mg/l).

The container undergoes isobaric process. The process of energy transfer as heat and effort between the system and the environment occurs in the isobaric process is the process of changing the state of the system at constant pressure when the bottle is opened to remove the gas, automatically the volume in the system will change that satisfies the equation $W = p \cdot (V_2 - V_1) = p \cdot \Delta V$ when the leachate is loaded in a packing bottle and ready for use in the test plant at any time 2 weeks the bottle must be opened to remove the gases for a steady or constant pressure. When leachate water is formed and has been inserted the bottle increases the evaporation temperature so that air circulation is required to maintain constant pressure.

5. Conclusion

The results showed that COOP program is a creative solution to develop UMKM with ethnosience approach that is:
1. UMKM engaged in a home-based industry that produces fast food show that the intensity of cooking oil usage affects oil viscosity value. The more the amount of usage the viscosity of oil will decrease. The results of this study occurred in the two brands of oil.
2. The manufacture of cassava opak can be studied using the principle of expansion. The expansion process occurs during the drying and opaque frying process. The main factor affecting the occurrence of expansion is temperature.
3. The treatment of carica skin waste can be explained by the stretching process of the skin sap, the electrostatic process when separating the particles in the filtration process and explaining the isobaric in the container when pressure is considered constant.

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