PROFILLING OF COCONUT MILK PRODUCT

PRACTICAL TRAINING REPORT

This practical training report is submitted for the partial requirement for Bachelor Degree

By :
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FACULTY OF AGRICULTURAL TECHNOLOGY
SOEGIJAPRANATA CATHOLIC UNIVERSITY
SEMARANG

2017

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APPROVAL PAGE

PROFILLING OF COCONUT MILK PRODUCT

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This practical training report has been approved and supported by examiner in Practical Training Exam

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Semarang, July 4th 2017

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PREFACE

Gratitude belongs only to the Almighty One, who has given His blessing to the author for taking the time to complete this practical training report entitled "Profilling of Coconut Milk Product" This practical training report is submitted to fulfill one of the requirements to gain bachelor degree of Agricultural Technology Faculty, Food Technology Department, Soegijapranata Catholic University.

In finishing this report, the writer really gives regards and thanks for people who has given guidance and help; they are:

1. Dr. Tatsawan Tipvarakarnkoon, the advisor, who has given her best guidance for this practical training, from conducting the test until finishing paper.
2. Dr. A. Rika Pratiwi, Msi , 2nd advisor, who has also given his best support and guiding together for this practical training, from the beginning until it has finished.
3. Dr. ChurdcaiCheowtirakul, Dean of Faculty of Biotechnology, Assumption University, who has given the opportunity to carry on the practical training in his faculty.
4. Dr. V. Kristina Ananingsih, ST., MSc., Dean of Faculty of Agricultural Technology, Soegijapranata Catholic University, for giving the information and chance to join the practical training abroad.
5. My family, parents, Aris Sukarno, Tinon Martanita, my younger brother, Fathan Adyatma, for always being number one supporter and saying my name in every prayer.
6. Kenny, Onny, and Lina who has giving support, help, and being been best practical training mates during the process.
7. Shauma, Belle, Della, and Geo who always support and help during the process
8. All people who has directly and indirectly helped during the practical training until finishing the report.

Finally, the writer realizes that there are unintended errors in writing this report. The writer really allows all readers to give suggestions to improve its content in order to be

made as one of the good examples for the next practical training. Big hope from the writer that this report can be useful for others.

Semarang, July 4th2017

Writer

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1. INTRODUCTION

1.1. Profile of The Institution

1.1.1. Assumption University

Assumption University (AU) is a private-based Catolic University in Thailand that administrated by the Brotheers of St. Gabriel. Assumption University was built on 1969 which originated from Assumption Comercial College with under the name of Assumption School of Business. After May 1972, Ministry of Education approval officially established as Assumption Bussines Administration College or AbAC and in 1990 they changed the status as Assumption University and still provide education in Thailand till now. Assumption University also the first International University in Thailand. Assumption University located in 3 different area of Bangkok which in Suvarnabhumi campus, Huamak, and Central World Plaza.

Assumption University provide three degree program and many kind of major such as Biotechnology, Law, Art, Business Administration, Communication Art, Architecture, Nursing, Engineering, Information Technology, Science, Music, and English. As the International University, AU accepted Thailand students and also foreign students. From the data statistical information for Academic Year on 2014 AU have 17.801 students with 14.897 Thai students and 2.904 International students with 90 different nationalities. Based as international community and Christian inspiration, Assumption Unversitypursuit of truth and knowledge, serving the humatsociety,especially through the creative use of interdisciplinary approaches and cybertechnology.

Figure 1. Logo of Assumption University of Thailand

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1.1.2. Faculty of Biotechnology

The Faculty of Biotechnology was estabilished in 1993 and it's the ninth faculty in Assumption University which produce graduates working in biotechnology field and its related fields. Faculty of Biotechnolgy of Assumption University has provided two bachelors program in Agro Biotehnology and Food Biotechnology with 4-year studies. Since 1997, the aceademicstandart of both of the program already approved by the Ministry of University Affairs. The Faculty objective is to provide the nation with highly trained professional who are to implement the scientific principles to the continuous improvement of the safe, quality, and value biotechnological services and products. After that, faculty of the Biotechnolgy has produced 4 classes of graduate with the degree of BS in Agro-Industry and in Food technology for Thailand.

Figure 2. Logo of Biotechnology Faculty

1.1.3. Vision

To be the leading international biotechnology school developing human resources and expanding and transferring knowledge for continuous improvement of the safety, quality and value of agricultural and food products through the excelling in the creation of new knowledge and application in Biotechnology appropriated for development of the country/community.

1.1.4. Mission

1. Providing exemplary educational opportunities that will prepare students to contribute to a dynamic, diverse and global society and pursue lifelong learning;
2. Use the best-suited scientific tools and systems to solve both fundamental and applied scientific questions pertaining to agro-industry and food science;

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3. Improve competitiveness and profitability of growers and processors of fruit and vegetable crops, animals, and other expanding agro industries;
4. Develop and implement food biotechnologies to ensure the wholesomeness of foods;
5. Improving individual, family and community well-being through the discovery and dissemination of knowledge in the agricultural, food systems, life and environmental sciences;
6. Providing knowledge in the biological, physical and social sciences necessary to optimize the profitability, sustainability and productivity of the country's agricultural resources while fostering stewardship of natural and human resources;
7. Help create, attract, and retain agricultural, food, and biotechnology enterprises between international countries.
8. Addressing the role of the Assumption University in enhancing and developing student and industry interactions as a viable part of the global economy.

1.1.5. Strategic Goals

1. Students are competent human resources who responsibly contribute to a dynamic and diverse society and appreciate different cultures.
2. Students and faculty members are able to create, transfer and expand knowledge through research development in biotechnology, food technology and agro-industry to solve problems pertaining agriculture and food science for a well-being of the country.

1.1.6. Faculty Members

1.1.6.1. Administrators

The main administrators of the faculty are in follow:

- Dr. ChurdchaiChowtirakulas Dean and Director of Ph.D. program in Food Biotechnology
- Dr. ViyadaKunathingan as Director of M.Sc. in Food Biotechnology

- Dr. AussamaSoontrunnarudrungsrias Chairperson of Department of Food Technology
- Dr. PrathipChiaravanond as Chairperson of Agro-Industry Technology Departement

1.1.6.2. Instructors

In academic year 2005, the Faculty of Biotechnology has 19 full-time instructors, three teaching assistants, one administrative staff and two laboratory technicians. The faculty also invited 14 part-time qualified instructors to teach the students from 1st year to 4th year. Academic ratios of the full-time instructors and part time instructor in 2004 are as follows.

- Full time instructor Ph.D.: MS : BS = 3:13:3
- Part time instructor Ph.D.: MS : BS = 5:8:0

1.2. Purpose of Practical Training

- To give the student an experience to deal with food research, so that the student can implement the knowledge that was learned in the real industrial or scientific world.
- To give the student an opportunity to adapt with new culture and society.
- To broaden the student's knowledge and experience in the international exposure.

1.3.Time and Place of Practical Training

The practical training was performed at the Faculty of Biotechnology, Assumption University Hua MakCampus, Bangkok, Thailand, in 10th January to 10th March 2017.

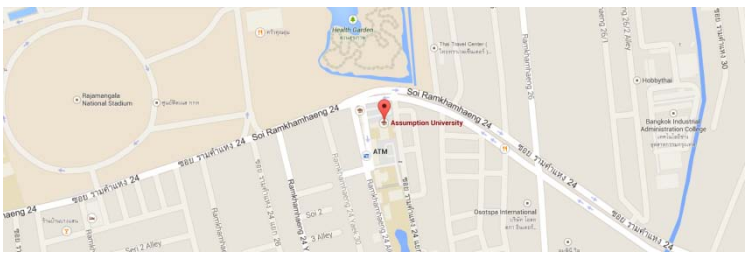

Figure 3. Map of Assumption University, Hua Mak, Bangkok

The red indicator shows the location of Assumption University Hua Mak which is located in ABAC (Ramkhamhaeng 24), Assumption University, Hua Mak, Bangkok 10240, Thailand (Telephone:+6623004543).

2. BACKGROUND RESEARCH

Coconut (*Coconucifera L.)* is belong to the palm family (*Arecaceae).* Coconut itself commonly used as source of coconut oil, milk and cream products which can be processed as coconut milk product such as coconut water and coconut milk (Borges*et. al*, 2012). From Seow and Gwee (1997) said that coconut milk itself is extracted from endosperm of mature coconut with the natural oil-in-water emulsion. In general, coconut milk can be described as milky white juice by pressing the grated coconut flesh with or without added water. It has important role in many tradition food especially in Asia regions (Chiewchan*et al*., 2006). Coconut milk naturally contain stabilized coconut protein such as globulin and albumin which present in aqueous phase of the coconut milk with fat globules and act as emulsifier by surrounding its surface (Peamprasart and Chiecham, 2006). Many valiant attemps are being made commercially, to extend the shelflife of coconut milk by canning, aseptic packaging and spray drying (Seow and gwee, 1997).

Commonly, coconut milk used for food ingredients but also as an important substance for health and medicine. There are many varieties of processed coconut milk products by differenttemering process such as pasteurization, UHT, sterilization, and a spray drying method. The tempering process has an effect on the coconut milk qualities and prolongs shelf life when compared with unheated coconut milk samples (Seow and Gwee, 1997). In term of coconut supply, mostly the Asia Pasific region accounts for 87% of global production, with the 'Big Three' countries producing 765 – Indonesia (16 billion nuts), India (13 billion) and Phillipines (13 billion). For Thailand has good yields of 5000-7700 nuts per hectare per year compared to the world average. From World Coconut Market Value Statistical, 2006, showed that India, Indonesia, and Philipines are the biggest consumer of coconuts while The Thai Ministry of Agriculture and Cooperative reports coconut milk production estimated 53000 mt of coconut milk. World Coconut Statistical, 2006, estimated that 75% of Thailand's annual coconut production is consumed domestically in the form of processing food, beverage, and drinking nuts.

The food and beverage sector contributes to the Thai national income, employment, value added inducement and foreign exchange earning. Thailand food industry provides the employment to approximately 600,000 people. As the sole net food exporter in Asia and has the capacity to produce far than its consumes, Thaliand's food industries have developed rapidly throughout the past decade and is one of the most developed in South East Asian region (Rodmaneeand Huang, 2013).

Based with Meilgaard*et al*.(2006), sensory testing have primary funcition to provide reliable data on which sound decisions may be made and using sensory profiling could be important tool in the food industry since it is generally used for new product development, maintance of product and marketing strategies defintion. The Sensory Test has three important advantages: it identifies the presence of notable differences, identifies and quantifies important sensory characteristics in a fast way, and identifies specific problems that cannot be detected by other analytical procedurs, as consumer preference, for instance (Nakayama and Wessman, 1979). Nowdays, demands of sensory methodology and technology have grown tremendously around the world, most sensory test have been developed. Recent year, technique of sensory profiling have been developing with the help of untrained assesors or consumers and studied in order to overcome some limitations of descriptive analysis (Valentin *et al.* 2012; Varela and Ares, 2012). The example of those sensory profiling methods are sorting, flash profile, projective mapping and Check-All-That-Apply questions (CATA) (Adams *et al.* 2007). In this study, the method we used are Check-All-That-Apply or CATA.

In the CATA (Create-all-that-apply) method (Lancaster and Foley, 2007), the constumers are answered by their based preferences by check all perceived attibutes in a specific product. One of the advantage of this method it is relatively easy to perform, can be completed very quickly because of the minimal instruction and there is no scaling since no intensities are given to the attributes.Furthermore, it could be a more pratical approach than intensity scaling from the standpoint of consumer led product development. The data of CATA can be used for the creation of preference maps correlating hedonic judgement with sensory attributes (Dooley *et al*., 2010).

CATA is different from scaling in the sense that no intensities are given to the attributes. In addition, the descriptors are not constrained to product sensory attributes but also be related to product usage or concept fit. CATA Sensory also provides in information which attributes are detectable according the panelist and how how may relate to their overall liking and acceptance. This sensory also can help the new development of new product since CATA response are directly linked to consumer perception.However, CATA question list for these test for both of session are presented in 'fixed' or same order for all products and satisfying behaviour of consumer panelist might be affecting the data of drivers liking that may not be stable.

The main goal of this study are:

- To profile the attributes of Thailand Coconut Milk by Thai consumer
- To describe liking coconut milk product from Thailand people preferences
- To compare results with formulated sample

3. RESEARCH METHODOLOGY

3.1. Materials

The materials that used in this research was Thailand Coconut Milk. Other ingredients for sampe was Fresh Coconut Milk that purchased from local grocery store. The products categories and samples used in this study are listed below.

- Thailand Coconut Milk :

1. Chaokoh Canned Coconut Milk

Figure 4. Chaokoh Canned Coconut Mik

2. Ampawa Canned Coconut Milk

Figure 5. Ampawa Canned Coconut Milk

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3. Chaokoh Coconut Milk

Figure 6. Chaokoh Coconut Milk

4. Tastifit Coconut Milk

Figure 7. Tastifit Coconut Milk

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5. Chaokoh Brown Coconut Milk

Figure 8. Chaokoh Brown Coconut Milk

6. ChaokohRehyderated Coconut Milk

Figure 9. Chaokoh Rehydrated Coconut Milk

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3.2.Methods

3.2.1. Sample Preparation

The sample used for each categories were commercially available both in Thailand and Indonesia. In this study, there are 4 sensory session with 4 different kinds of sample. The first sample is Curry Coconut Milk using Thailand Coconut Milk. The second sample for second sensory is Thailand Processing Coconut Milk.

3.2.1.1.Curry Coconut Milk Preperation

First, Measure coconut milk with certain weight before separate it for 20% and 60% volume of the measured coconut milk. After that, prepare the paste which weight of 10% used coconut milk and add them with 20% coconut milk then mixed well. Mix them until 1 minute and the colour turns to be yellow. Then, add sugar which weight of 8% from the used coconut milk and 5% percentage of fish sauce from the coconut milk. Last, cooked it until it reach 90°C for 2 minute. The final of curry coconut milk sample placed in a small circular cups with 3- digit code and arranged in random order.

3.2.1.2.Processing Coconut Milk Preperation

Thailand Coconut Milk were poured in a small circular coups with 3- digits code and arrange in random order.

3.2.2. Participants

The participants studies were conducted in Thailand (Assumption University), each session with 50 both trained and untrained participants. In this sensory, participants need to be screened which they usually consumed coconut milk, do not have any allergic of coconut milk, and must be living in Thailand. Based on (Benedito, Cárcel, &Mulet, 2001; Guerrero, Gou, &Arnau, 1997;Husson&Pagés, 2003; Lelievre, Chollet, Abdi, & Valentin, 2008), in CATA Sensory both of trained and untrained panelist are allowed to do sensory since it has been shown that difference in sensory evaluations between trained and untrained panelist are minimal.

3.2.3. Consumer Tests

3.2.3.1. Sensory Test

This study were taking place in Sensory Laboratorium, E5, Assumption University, Hua Mak Campus which designed based ISO 8589 (ISO 2007) and performed under artificial daylight-type illumination, temperature control (between 22 and 24°C) and air circulation.

The panelist of the sensory were the consumers who usually consumed coconut milk and asked to taste and evaluate the sample. Coconut milk sample were prepared in available cups with 3-digit code and placed in tray. Each consumer would have seven samples of products. The order of the samples given was randomized so consumer would have no idea what is the first or second sample they evaluated, and the bias could be minimized.Costumers should answer and check the attributes in the questonaire based on their opinion of the sample.

3.2.3.2. Data Analysis

The mapping data for CATA sensory was performed by R - program. R is an open soure programming language and software environment for statistical computing and graphics that is supported by the R foundation for statistical computing. The R language is widely used among statisticians and data miners for developing statistical software and data analysis. One of the R's strengths is the ease with which well-designed publication-quality plots can be produced, including mathematical symols and formula where needed.

4. RESULTS AND DISCUSSION

The high level of consumption in Thailand society including processed coocnut milk which is recorded base on statistics result conducted by Thai Minisitry Agriculture and Coorperative spur the producers to develop processed coconut products. In daily life, thare many of coconut processed products which easily to found and to become one of the main ingredients with mixed in the daily food consumption by Thailand citizen because of savory taste also coconut their sweet taste. There are plenty different of commercial coconut milk product with using different technique such as UHT, sterilization, pasteurization, and spray drying method.

In this study, there were 50 consumers who particaipated in each CATA Sensory. Based on (Macfie&Hedderley, 2005), in CATA Sensory the consumer is allow to choose any word or a few word how they describe the product and after that the attributes can be evaluated which the result will be less exepensive and the data of the consumer acceptance and percepetion view will be more accurate. For this study, the consumer who is doing sensory are untrained panelist however, based from (Benedito, Cárcel, &Mulet, 2001; Guerrero, Gou, &Arnau, 1997;Husson &Pagés, 2003; Lelievre, Chollet, Abdi, & Valentin, 2008), in the study shown that there is only minimal difference between used trained and untrained panelist. For this research, there are two different sensory which are Original and Savory Thailand Coconut milk and from the result can be analysis how well the Thailand people described their Thailand Coconut Milk.

4.1.Processed Thailand Coconut Milk

For the Processed Thailand Coconut Milk sensory, the sensory code of the sample product are shown in Table 1.

Table 1. Processed Thailand Coconut Milk code product list.

Code Product	Product Name
123	Chaokoh Canned Coconut Milk
242	Ampawa Canned Coconut Milk
363	Chaokoh UHT Coconut Milk

484	Tatsifit UHT Coconut Milk
505	Chaokoh Brown Coconut Milk
616	Chaokoh Rehydrated Coconut Milk
727	Fresh Coconut Milk

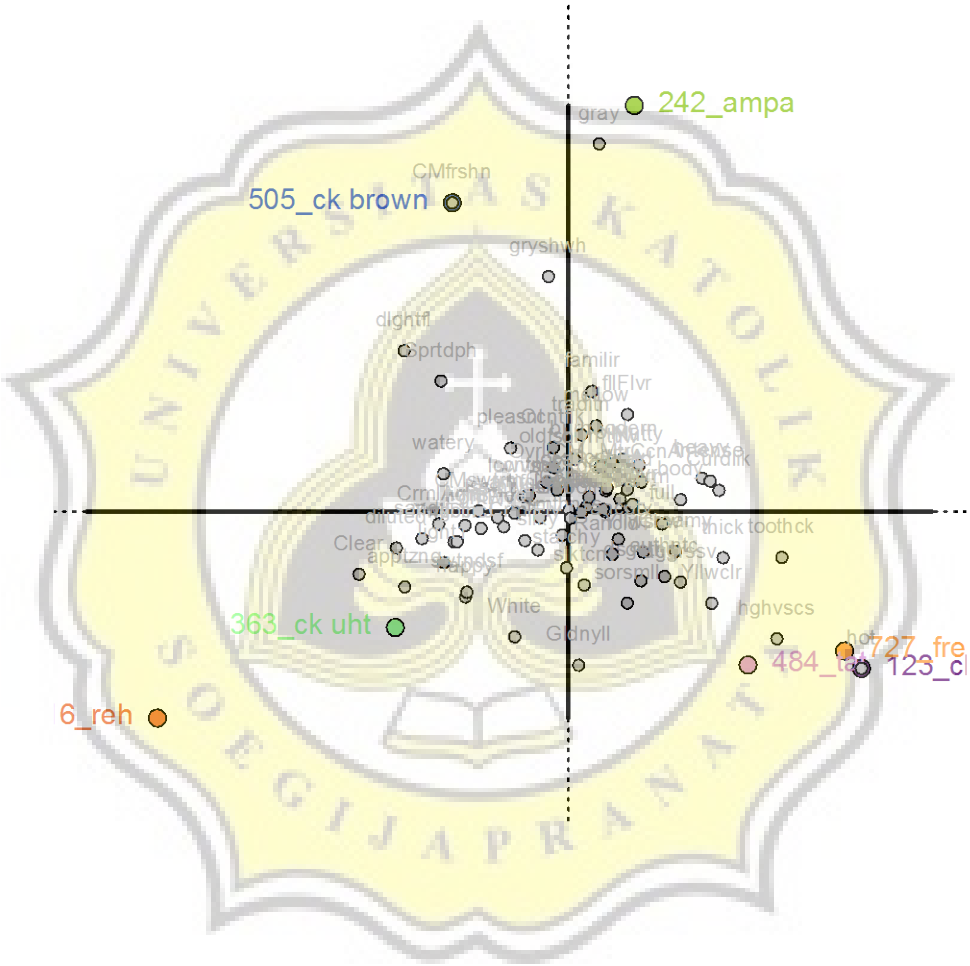

Fig 10. Multiple factor analysis Thailand Coconut Milk using consumer CATA counts. Products codes are listed in Table 1.

The results of individual Thailand Coconut Milk maps by using consumer CATA counts shown in fig. 10. Overall, based on CATA maps, fig. 10 indicates that Ampawa Canned Coconut Milk ,Tatsifit UHT Coconut Milk, and Chaokoh Brown UHT were characterized for the first dimension because their dots are close to the dimension one. Hence, for the product Chaokoh Canned Coconut Milk, Chaokoh UHT Coconut Milk,

and Chaokoh Rehydrated Coconut Milk were characterized by CATA counts for the second dimension.

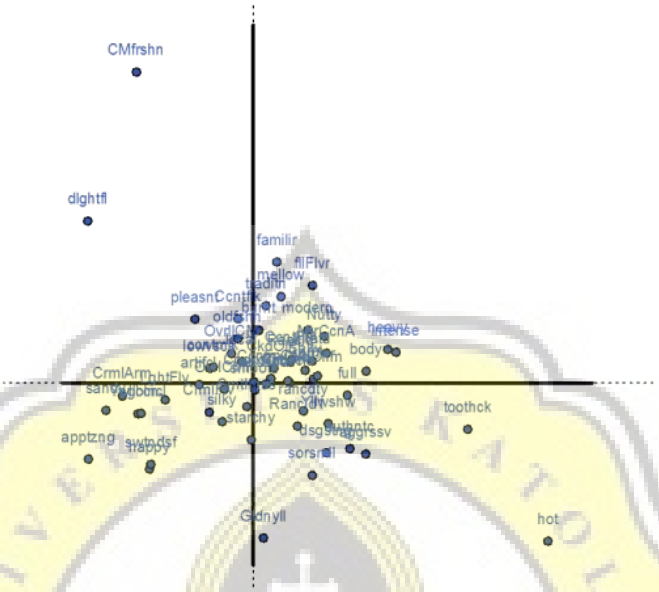

Figure 11. Mapping of each attribute describing of each Coconut Milk product by the Consumer.

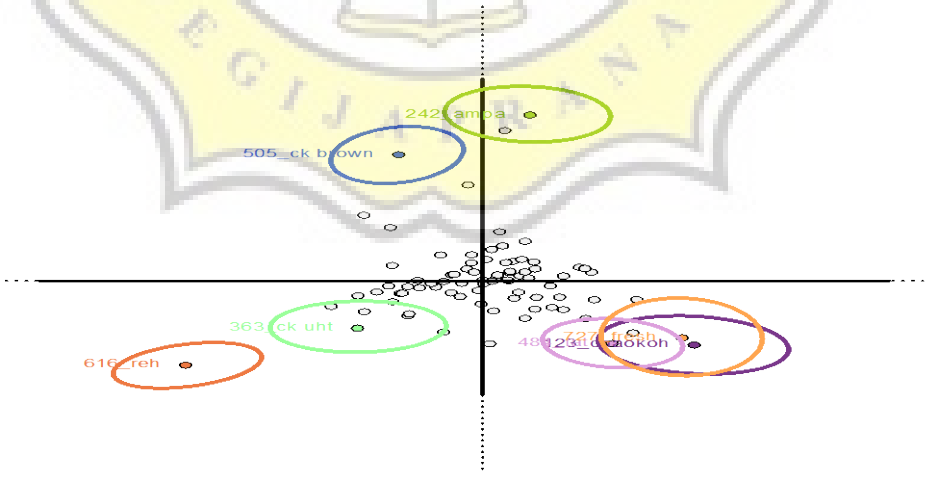

Figure 12. Results of preference mapping of Thailand Coconut Milk Product.

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Overall, the customer represent each product differently as shown in Figure 12. The AmpawaCanned product which located in second dimension was remembered by costumer for the gray colour and Chaokoh Brown UHT represent by their freshness. For Chaokoh UHT was represent represent by appetizing and sweet flavor. Three product which placed as the same group Chaokoh Canned, TatsifitUHT ,and Fresh Coconut Milk mainly characterized by the sensory attributes of high viscous coconut milk by consumer.

The results of external preference mapping using CATA counts are grapichally shown in Figs. 12. There are five groups of product charactergorized in this result which are group one consist of Ampawa Coconut Milk, group two consist of Chaokoh Brown Coconut Milk, group three consists of Chaokoh UHT Coconut Milk, group four consists of Chaokoh Rehydrated Coconut Milk, and Chaokoh Canned Coconut Milk ,Tastifit Coconut Milk,Fresh Coconut Milk formed a fifth group which characterized by the panelist high viscous coconut milk. Also, Chaokoh Canned and Tastifit have the similar taste from fresh coconut milk which coconut milk used as the control. Hence, Chaokoh Rehydrated indicated that they were well describedby their characteristics as similar attributes as Chaokoh UHT but the Rehydrated is more intense in some attributes than Chaokoh UHT since as shown in the figure since the line of the figure not close to the line.

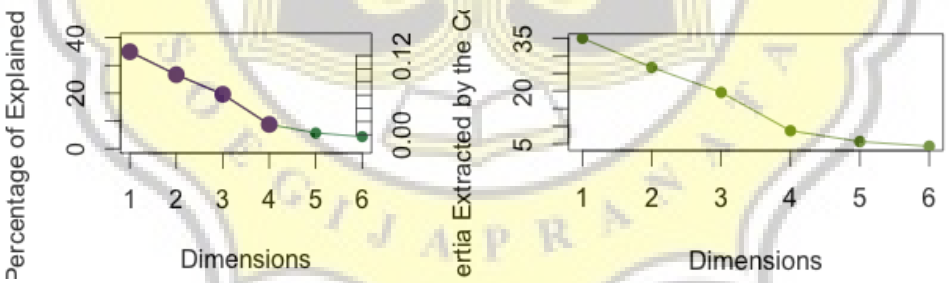

Fig 13 and 14. Explained Variance per Dimension of Thailand Coconut Milk processed with R-program.

Figure 13 and 14. Represent the percentage of explained variance per dimension of the Thailand Coconut Milk which analyzed by R-program. From the data, there are reduction of the percentage with the increase of the dimension. For the first dimension explained 35% of the variance and second dimension explained as 25%.This result indicates that there is no significally different between first dimensions and second dimensions.

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4.2.Savory Thailand Coconut Milk

For the Savory Thailand Coconut Milk, the sensory code of sample product are shown in Table 2.

Table 2. Savory Thailand Coconut Milk code product list.

Code Product	Product Name
093	Chaokoh Canned Coconut Milk
948	Ampawa Canned Coconut Milk
803	Chaokoh UHT Coconut Milk
658	Tatsifit UHT Coconut Milk
771	Chaokoh Brown Coconut Milk
110	Chaokoh Rehydrated Coconut Milk

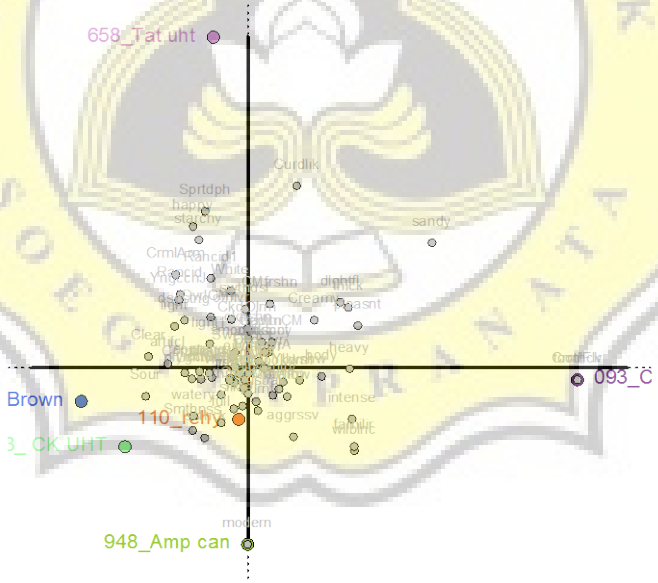

Fig 15. Multiple factor analysis Savory Thailand Coconut Milk using consumer CATA counts. Products codes are listed in Table 2.

From the figure 15, it has been seen that the panelist scored differently each product compared to the sensory of Thailand after the sample is mixed with the curry powder. According to the picture, for the sample Chaokoh Rehydrated, Tatsifit UHT, Ampawa canned

werecharacterized for the first dimension since close to line. On other hand, Chaokoh UHT, Chaokoh Canned, Chaokoh Brown UHTresult showed the samples were characterized as second dimension.

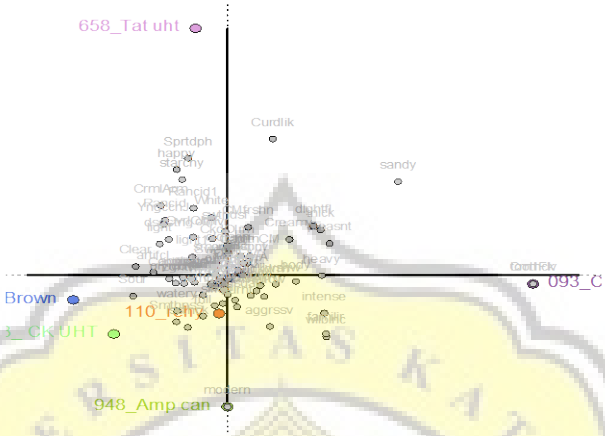

Figure 16. Mapping of each attribute describing of each Coconut Milk product by the Consumer.

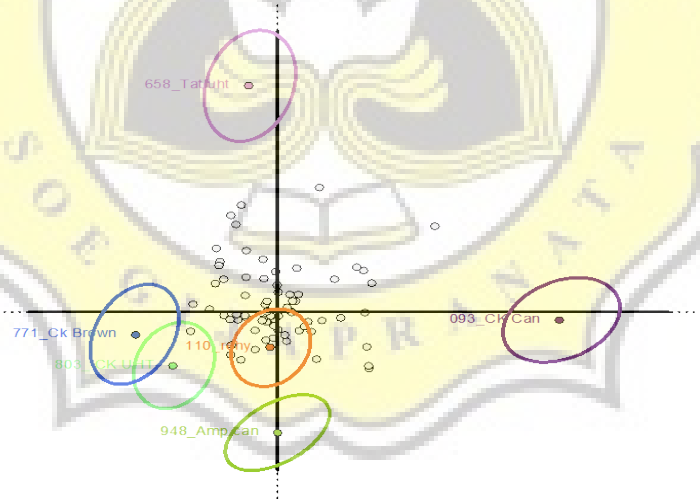

Figure 17. Results of preference mapping of Savory Thailand Coconut Milk Product.

From the result above,through analysis using R-analysis program, the data showed that there are two products that Chaokoh Brown and Chaokoh UHT have the same attribute characteristic after sensory test from panelists. Hence, the consumer scored the attributes of thailand coconut milk diffrently after cooked and turned to be savory product. For the

ChaokohCanned, panelist considered the product by their caramel colour and in Ampawa Canned product recognized have modern atributes. Both for Chaokoh Brown and Chaokoh UHT have known by their sour attributes. As for the Chaokoh Rehydrated many of thepanelist checked for the full and silky attributes for their particular characteristic. However, in the mapping analysis data for Tatsifit UHT, it conclude that the product does not have a distinctive attributes by the panelist after tasting the savory product using Tatsifit UHT.

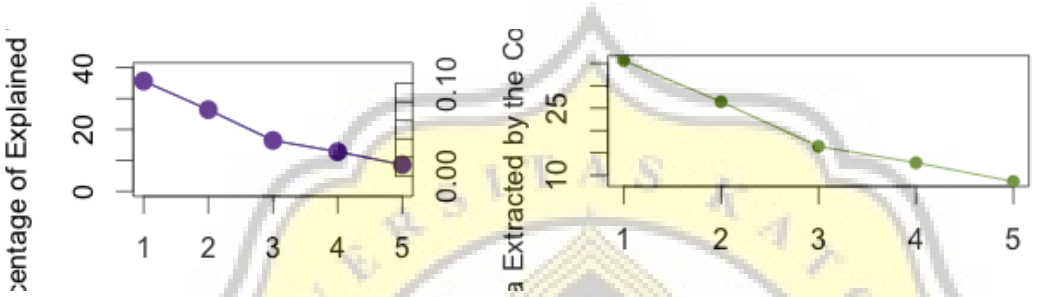

Fig 18 and 19. Explained Variance per Dimension of Savory Thailand Coconut Milk processed with R-program.

The explained variance per dimension scored of 6 samples Savory Thailand Coconut Milk was shown in figure 4 and figure 5. From the graphic, there is a decrease in the percent value of each dimension increase whereas in the dimensions of one percentage number denotes a figure of about 38% and for dimensions 2 percentage of about 20-25%. This result indicates that there is no significally different between first dimensions and second dimensions.

Based on the Check-All-That-Apply sensory results between Thai Sensory Coconut Milk Original and Savory Thai Coconut Milk , result showed that many panelists have described the character of same Thailand coconut milk product in separate two sensory differently such as for example the panelists describe Chaokohas high viscous but in Savory Coconut Milk characterized by caramel colour. According to Sudman and Bradburn (1982) the difference might be shown when the panelist are required to select the character of the attributes it can be some uncertainty for choosing what attribute is suitable to describe the sample of coconut milk or since the benefit of CATA panelist can choose the attributes freely so in sometime they prefer to be neutral or not choose the appropate characteristic for the sample. Then, the selection time of the sensory can also affect which this sensory is only done at week intervals

so that the panelist can feel fatigue and complacency. Another factor of the bias sensory characterist is the number of untrained panelists used in the first sensory can respond the free test incorrectly so it requiring prior or warm up sample training before the actual test (Wakeling and Macfire, 1995).

On the other hand, result from CATA sensory make it easy to know the attributes of the characteristic of coconut milk product that can be done easily only with checking the mark of attributes so using this information can know the category of product favored by people in Thailand. This informantion can be benefit for the product development in Thailand which can increase the consumption rate of coconut milk.

5. CONCLUSION

One of the sensory techniques, CATA, is one of the easiest sensory and can be completed very quickly with trained or untrained panelist to check all the atributes of the sample based on their preference. In this study, coconut milk, our panelist finds that every coconut milk product hassignificant attributes ehich different from others. However, in this study after sampe prepared using the formulation of the samples, the results showed that the panelists rate the characteristics of the same coconut milk product having distinctattributes after formulation. It might be happen because of several factors, such as panelists can not decide on the right attributes because they have not be trained or simply choose originally because of disadvantage in CATA which the panelists given the freedom to choose attributes on the sample. However, this result of the attributes of coconut milk can be theinformantionwould be the benefit for the product development in Thailand which can increase the consumption rate of coconut milk.

6. REFERENCE

Abdi, H., & Valentin, D. (2007). Multiple factor analysis (MFA). In N. Salkind (Ed.), Encyclopedia of measurement and statistics. Thousand Oaks, CA: Sage Publications

Benedito, J., Cárcel, J. A., &Mulet, A. (2001). Cheese hardness by experts anduntrained judges.Journal of Sensory Studies, 16, 277–285

C Borges; B Bjorn; D Petr. (2012). Food Research International, 47: 146–151

Chiewchan, Naphaporn, Luxsika Ngamwonglumlert abd Sakamon Devahastin. (2016) Effect of pretreament and drying methods on molecular structure, functional properties and thermal stability of fibre powder exhibiting colour from *Centella asiatica L.* Volume 51, Issue 3, pages 753-764, March 2016.

Deliza, R., Macfie, H., & Hedderley, D. (2005). The consumer perception of passion-fruit juice using free choice profiling.Journal of Sensory Studies, 20, 17–27

Dooley, Lauren, Yong-Seung Lee, and Jean- Francois Meullenet. (2010).The application of check-all-that-apply (CATA) consumer profiling to preference mapping of vanilla ice cream and its comparison to classical external preference mapping. Volume 21, Issue 4, June 2010, Pages 394-401

Guerrero, L., Gou, P., & Arnau, J. (1997). Descriptive analysis of toasted almonds: A comparison between expert and semi-trained assessors. Journal of Sensory Studies, 12, 39–54

Husson, F., & Pagés, J. (2003). Comparison of sensory profiles done by trained and untrained juries: Methodology and results. Journal of Sensory Studies, 18,453–464

J. Adams, A. Williams, B. Lancaster, M. Foley (2007) Advantages and uses of check-all-that-apply response compared to traditional scaling of attributes for salty snacks. 7th Pangborn Sensory Science Symposium. Minneapolis, USA, 12–16 August, 2007 (2007)

Lancaster, B., & Foley, M. (2007). Determining statistical significance for choose-allthat-apply question responses. Seventh pangborn sensory science symposium, Minneapolis, USA.

Lelievre, M., Chollet, S., Abdi, H., & Valentin, D. (2008). What is the validity of the sorting task for describing beers? A study using trained and untrained assessors. Food Quality and Preference, 19, 697–703

Morten C. Meilgaard, B. Thomas Carr, Gail Vance Civille. (2016). Sensory Evaluation Techniques, Fourth Editionby CRC Press

Nakayama, Michiko and Collen Wessman. (1979). Application of sensory evaluation to the routine maintance of product quality.Food Technology: Agris.

Seow, C. C., &Gwee, C. N. (1997). Coconut milk: chemistry and technology. International Journal of Food Science and Technology, 32, 189–201

Sudarin Rodmanee and Wen-Chi Huang, (2013).Efficiency Evaluation of Food and Beverage Companies in Thailand: An Application of Relational Two-Stage Data Envelopment Analysis," *International Journal of Social Science and Humanity* vol. 3, no. 3, pp. 202-205,

Sudman, S., & Bradburn, N. M. (1982).Asking questions. San Francisco, CA: Jossey-Bass.

T. Peamprasart, N. Chiewchan, J. Food Eng. 77, 653- 658 (2006)

Valentin, D., Chollet, S., Leli`evre, M., & Abdi, H. (2012). Quick and dirty but still pretty good: A review of new descriptive methods in food science. International Journal of Food Science & Technology, 47, 1563–1578.

Varela, P., Ares, G. (2014). Novel Techniques in Sensory Characterization and Consumer Profiling. Boca Raton: CRC Press.

Wakeling, I.N. & MacFie, H.J.H. (1995). Designing consumer trialsbalanced for first and higher orders of carry-over effect when onlya subset of k sample from t may be tested. Food Quality andPreference, 6, 299–308

ORIGINAL THAILAND COCONUT MILK

SENSORY EVALUATION

Consumer No. _____ Sample No. _____

This questionnaire is designed for a research entitled, 'Profiling of coconut milk', in partial fulfilment data of the research. This research aims is tosurvey the pattern of coconut milk consumption and to discover the extent to which the consumers perceive and accept the product.

Instruction: Please taste the samples; remember to rinse your palate with water or saltine crackers before tasting the other. Please put a check mark (✓) on the box that corresponds to your answer.

1. Please check all the terms that describe the **sample's appearance** attributes.

❑ Yellow color
❑ Golden yellow color
❑ Turbid/cloudy
❑Curd-like
❑Sleek to container
❑ Smoothness
❑White
❑Clear
❑ Separated-phase
❑Low viscous
❑ Grayish White
❑ High viscous
❑ Gray

2. Please check all the terms that describe the **sample's aroma** attributes.

❑ Overall coconut milk aroma
❑ Coconut milk sweet aroma
❑ Coconut meat / Coconut milk freshness
❑ Rancid
❑ Caramel aroma
❑ Coconut Flake Aroma
❑Mature Coconut

3. Please check all the terms that describe the **sample's flavor and taste** attributes.

❑ Salty	❑Cooked Flavor	❑ Burnt
❑Sweet	❑Sour	❑Very Spicy
❑ Rancid	❑ Nutty	❑Mild Spicy
❑Cooked Oil Aroma	❑Overall Coconut Milk Flavor	❑Coconut milk sweet flavor
❑Coconut Milk Fresh	❑Full flavor	❑ Off flavor
❑Caramel Flavor	❑Light Flavor	❑Coconut flake flavor

4. Please check all the terms that describe the **sample's mouthfeel** attributes.

❑ Creamy	❑ Light	❑ Thick
❑Watery	❑ Heavy	❑Less thick
❑ Oily	❑ Smooth	❑Body
❑Oily moutg creating watery	❑Silky	❑Sandy
❑Too thick	❑Starchy	❑ Diluted

5. Please check all the terms that describe your **emotion** after tasting the attributes.

❑ Happy	❑Sweet and soft	❑Mellow
❑Iritated	❑Delightful	❑ Full
❑Aggresive	❑Pleasant	❑Tradition
❑ Light	❑Well Balance	❑ Disgusting
❑Old Fashion	❑Authentic	❑Appetizing
❑Intense	❑Artificial	❑Local
❑Modern	❑Familiar	❑Unusual

SAVORY THAILAND COCONUT MILK

SENSORY EVALUATION

Consumer No. _____ Sample No. _____

This questionnaire is designed for a research entitled, 'Profiling of coconut milk', in partial fulfilment data of the research. This research aims is to survey the pattern of coconut milk consumption and to discover the extent to which the consumers perceive and accept the product.

Instruction: Please taste the samples; remember to rinse your palate with water or saltine crackers before tasting the other. Please put a check mark (✓) on the box that corresponds to your answer.

1. Please check all the terms that describe the **sample's appearance** attributes.

❑ Yellow color
❑ Golden yellow color
❑ Turbid/cloudy
❑Curd-like
❑Sleek to container
❑ Smoothness
❑White
❑ Separated-phase

2. Please check all the terms that describe the **sample's aroma** attributes.

❑ Overall coconut milk aroma
❑ Coconut milk sweet aroma
❑ Coconut meat / Coconut milk freshness
❑ Rancid
❑ Caramel aroma
❑ Coconut Flake Aroma
❑Mature Coconut

❑ Cooked aroma

❑Young Coconut Aroma
❑Cooked Oil

3. Please check all the terms that describe the **sample's flavor and taste** attributes.

❑ Salty
❑Sweet
❑ Rancid
❑Cooked Oil Aroma
❑Coconut Milk Fresh
❑Caramel Flavor
❑Cooked Flavor
❑Sour
❑ Nutty
❑Overall Coconut Milk Flavor
❑Full flavor
❑Light Flavor
❑ Burnt
❑Very Spicy
❑Mild Spicy
❑Coconut milk sweet flavor
❑ Off flavor
❑Coconut flake flavor

4. Please check all the terms that describe the **sample's mouthfeel** attributes.

❑ Creamy
❑Watery
❑ Oily
❑Oily moutg creating watery
❑Too thick
❑ Light
❑ Heavy
❑ Smooth
❑Silky
❑Starchy
❑ Thick
❑Less thick
❑Body
❑Sandy

5. Please check all the terms that describe your **emotion** after tasting the attributes.

❑ Happy
❑Iritated
❑Aggresive
❑ Light
❑Old Fashion
❑Intense
❑Modern
❑Sweet and soft
❑Delightful
❑Pleasant
❑Well Balance
❑Authentic
❑Artificial
❑Familiar
❑Mellow
❑ Full
❑Tradition
❑ Disgusting
❑Appetizing
❑Local
❑Unusual

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