# DEVELOPMENT OF PAD THAI PUFF

BY

NATCHARN SRITIPAKORN

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A special project submitted to
School of Biotechnology, Assumption University
In part fulfillment of the requirements of the Degree of Bachelor of Science in Biotechnology

2015

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**Academics year**: 2015

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Advisor

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Natcharn Sritipakorn

# Abstract

The study was aimed to formulate the Pad Thai Puff. Puff pastry dough formula was adjusted by decreasing the amount of puffin margarine from 60% to 40% in the formula to reduce oiliness of the product. For the Pad Thai stuffing, JAR test was carried with untrained test panelists and resulted in adjusting 3 attributes – sweetness, dried shrimps and garlic chives. The obtained Pad Thai formula from the adjustment composed of 4.7% vegetable oil, 20.7% dry shrimp, 8.3% finely chopped turnip pickle, 12.4% ground peanut, 10.4 chopped garlic chives, 16.6% chopped tofu, 10.7% egg, 4.1% sugar, and 12.4% Pad Thai sauce. Confirmation test showed that Pad Thai puff was preferred at 7.8±0.6 out of 9-point scale by the test panelists. Consumers acceptance test with general consumers showed that the prototype product was accepted by 96% of the consumers and 91% were willing to buy the product when launched at the price of 80 – 85 Baht per bag which is contained five pieces. The consumers gave the product preference score of 7.9±0.8 out of 9-point scale.

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# Introduction

Nowadays, markets in Thailand are currently having the wild development of products. People tend to come up with the idea of fusion foods and desserts by mixing oversee foods/desserts with Thai tastes/styles. For example, making cookies, puddings, pies, puffs or caking with Thai fruits flavors and smells such as Coconut cakes, Durian cakes, Green Curry pies, Thai Chicken Curry pies, Golden Apple puddings, Ginger puddings, etc. In consequence, I has chosen Puff product with one of the most famous Thai foods amongst foreigners that is Pad Thai. At the present, Thai people, both school and working age, live their lives in a hurry as they try to utilize every minutes productively. Puff product can definitely be the better choice for a meal as well as for munchies time because it is ready to eat easy to bring with. Thus, this product aims to formulate the most suitable formula of Pad Thai to match with puff pastry as much as it can. To create the new product to the market, by using the ingredients that are available in the market with possible acceptance of the consumers.

Pad Thai, phat Thai or phad Thai (Thai: ผัดไทย, rtgs: phat thai, ISO p̄hạdịthy) is a stir-fried rice noodle dish commonly served as a street food and at casual local eateries in Thailand. It is made with soaked dried rice noodles, which are stir-fried with eggs and chopped firm tofu, and flavored with tamarind pulp, fish sauce (nampla น้ำปลา), dried shrimp, garlic or shallots, red chili pepper and palm sugar, and served with lime wedges and often chopped roast peanuts. It may also contain other vegetables like bean sprouts, garlic chives, coriander leaves, pickled radishes or turnips (hua chaipo หัวไชโป๊), and raw banana flowers. It may also contain fresh shrimp, crab, squid, chicken or other proteins. Vegetarian versions may substitute soy sauce for the fish sauce and omit the shrimp.

A dish of stir-fried rice noodles is thought by some to have been introduced to Ayutthaya during the time of the Ayutthaya Kingdom by Vietnamese traders, and subsequently altered to reflect Thai flavor profiles. Others believe that the dish is of Chinese origin, and the etymology of the dish's name suggests it.

Pad Thai was made popular in Thailand during World War II. Pad Thai has since become one of Thailand's national dishes. Today, some food vendors add pork-chops to enhance the taste (although the original recipe did not contain pork because of the government perception that pork was a Chinese meat). Some food vendors still use the original recipe. It is a fast, delicious and nutritious dish, and has become popular in many countries around the world.

The way to formulate in order to find out the best formula was to use the Acceptance Test to develop/adjust/screen the formula. We processed Evaluation Puff for their flavor, texture, color and appearance. As a result, we figured out the fault which was the oiliness of the puff. We had decreased the amount of puffing margarine to meet consumers' satisfaction. For Pad Thai stuffing, we found out that 3 attributes (Sweetness, Dried shrimp Flavor and Garlic Chives Flavor) were in need of adjustment to be compatible with Puff. We used 9-poin hedonic scale to find out the most appropriate level of the 3 attributes.

This product was not made exclusively for Thai people in school and working age only but also to promote Thai foods to foreigner. Since there might be some foreigners who have not yet tried Pad Thai before, we will make use of this chance to promote Pad Thai internationally. The puff itself is more familiar to foreigners. Therefore, this product would possibly work out fine in the market because international trends have been substantially influential in Thailand including foods, desserts, technology, etc.

With the research making a Pad Thai Puff, the value of Puff pastry and Pad Thai will be increased as well. Also, there is no report of previous studies which was using Pad Thai dish as puff stuffing. Therefore, this project aimed to generate the new knowledge of applying Pad Thai as Puff's stuffing. At the same time, this project helped adding the value of Pad Thai as well as promoting the consumption of traditional foods to the consumers.

## Objectives

- To develop Pad Thai Puff
- To formulate of Pad Thai stuffing for Pad Thai Puff
- To determine the consumer acceptance of Pad Thai Puff

# Literature Review

**All-purpose flour**

All-purpose flour is made from a blend of high-gluten hard wheat and low-gluten soft wheat. It's a fine-textured flour milled from the inner part of the wheat kernel and contains neither the germ (the sprouting part) nor the bran (the outer coating). All-purpose flour comes in two basic forms—bleached and unbleached—that can be used interchangeably. Flour can be bleached either naturally, as it ages, or chemically. Most flour on the market today is presifted, requiring only that it be stirred, then spooned into a measuring cup and leveled off.

Ref. (The Food Lover's Companion, Fourth edition by Sharon Tyler Herbst and Ron Herbst. FoodTerm.com, 2007)

**Margarine**

Margarine is an imitation butterspread used for spreading, baking, and cooking. Hippolyte Mège-Mouriès created it in France, in 1869. Margarine, like butter, consists of a water-in-fat emulsion, with tiny droplets of water dispersed uniformly throughout a fat phase in a stable crystalline form. It is also commonly used as an ingredient in other food products, such as pastries, doughnuts and cookies, owing to its versatility.

Ref. (Margarine, Wikipedia)

**Egg**

The ultimate convenience food, eggs are powerhouses of nutrition, packed with protein and a range of 18 vitamins and minerals. They're also hugely versatile. Almost all eggs are edible but the most commonly consumed are hen's eggs. Bantam, quail, duck and goose eggs are also readily available and vary in size and flavor.

Ref. (Egg, Good Food made by BBC Worldwide)

**Salt**

Most recipes that call for salt are referring to table salt, which has additives like iodine (to prevent thyroid disease) and an anti-caking agent to prevent lumping in humidity. Many chefs prefer kosher salt (additive-free, coarse-grained) for cooking and sea salt for table use because they have a softer flavor than table salt. (Salt, Food.com) Salt is essential to the health of humans and animals, and is one of the five basic taste sensations. Salt is used in many cuisines around the

world, and is often found in salt shakers on diners' eating tables for their personal use on food. Salt is also an ingredient in many manufactured foodstuffs. Table salt is a refined salt containing about 97 to 99 percent sodium chloride.

Ref. (Salt: Edible Salt, Wikipedia)

**Puffin Margarine**

Puff pastry is characterized by its laminated structure of baked layers of dough separated by thin layers of margarine or fat. The ratio between the dough and the margarine is typically 2:1, as illustrated in table 1. During the lamination process each layer of dough will be separated by one layer of margarine. In puff pastry the numbers of layers are typically 144 or 288. However, puff pastries with up to 1458 layers are also produced. After preparation of the dough the layers can be illustrated as in figure 1 (across). After baking this lamination of the dough will result in a puff pastry with a nice lamination and volume (expressed as height and expansion).

Ref. (file:///C:/Users/Thinatticharn/Downloads/Palsgaard_puff_pastry_margarine.pdf)

**Garlic Chives**

Garlic Chives are also known as Chinese leeks, garlic chives impart oniony flavor with a distinctly garlicky overtone. Young leaves are most tender and work well in egg dishes, soups, marinades and Asian cooking (dumplings, pot stickers, and dipping sauces, for example). White, edible flowers appear in summer, and attract pollinators and other beneficial insects. Gather stems for bouquets or deadhead to keep plants from self-sowing. (That kind of growth tends to be aggressive in colder regions.) Give garlic chives full sun for best flowering and upright growth. The strappy-leafed clumps make an attractive edging in herb or vegetable gardens.

Ref. (Gralic Chives, Bonnieplants, 2015)

**Tofu**

Tofu, also known as bean curd, is a food made by coagulating soy milk and then pressing the resulting curds into soft white blocks. It is a component in East Asian and Southeast Asian cuisines. There are many different varieties of tofu, including fresh tofu and tofu that has been processed in some way. Tofu is bought or made to be soft, firm, or extra firm. Tofu has a subtle flavor and can be used in savory and sweet dishes. It is often seasoned or marinated to suit the dish. Tofu has a low calorie count and relatively large amounts of protein. It is high in iron, and

depending on the coagulants used in manufacturing (e.g. calcium chloride, calcium sulfate, magnesium sulfate), it can have higher calcium or magnesium content.

Ref. (Tofu, Wikipedia)

**Dried Shrimp**

Dried shrimp are shrimp that have been sun-dried and shrunk to a thumbnail size. They are used in many Asian cuisines, imparting a unique umami taste. A handful of shrimp is generally used for dishes. The flavors of this ingredient are released when allowed to simmer. Known as kung haeng in Thai cuisine, dried shrimp is used extensively with chilies and Thai herbs to produce various types of chili paste and Thai curry paste. Dried shrimp is also used in salads such as in the Northeastern Thai som tam (green papaya salad).

Ref. (Dried Shrimp, Wikipedia)

**Pickled Turnips**

The turnip or white turnip is a root vegetable commonly grown in temperate climates worldwide for its white, bulbous taproot. Small, tender varieties are grown for human consumption, while larger varieties are grown as feed for livestock. (Turnip, Wikipedia) Pickled turnips are a popular Middle Eastern mezes. Optionally, adding a beet slice to each jar turns the turnips pink.

Ref. (Pickled Turnips, Eatingwell, 2010)

**Peanuts**

Peanut is a small annual dicotyledonous herb growing up to a foot above the ground. It is thought to have originated in the Central Americas and from where it spread to rest of the world through Spanish explorers. Peanuts are rich in energy (567 calories per 100 g) and contain health benefiting nutrients, minerals, antioxidants and vitamins that are essential for optimum health. The nuts are rich source of minerals like copper, manganese, potassium, calcium, iron, magnesium, zinc, and selenium.

Ref. (Peanuts, Nutrition-and-You, 2009-2016)

**Dried Chili**

Dried Chili—also known as dried peppers, or dried chili peppers—are believed to be indigenous to the Andean region of Bolivia, Ecuador and Peru dating back more than 10,000 years. Chiles were a key ingredient in the diets of the Mayans and later the Aztecs. A true chilehead craves not only the heat (which of course is a delightful bonus) but also the unique flavors of these hot

peppers. Americans, Asian Indians, Caribbeans, Mediterraneans, Mexicans, South Americans and Southeastern Asians use chiles daily to add color, flavor, visual appeal and yes heat to their cuisines.

Ref. (Dried Chiles, Spicesinc, 2008-2016)

**Garlic**

Garlic is a sulphurous compound and in general a stronger tasting clove has more sulphur content and hence more potential medicinal value. Garlic is an herb that is grown around the world. It is related to onion, leeks, and chives. It is thought that garlic is native to Siberia, but spread to other parts of the world over 5000 years ago.Garlic is used for many conditions related to the heart and blood system. These conditions include high blood pressure, low blood pressure, high cholesterol, inherited high cholesterol, coronary heart disease, heart attack, reduced blood flow due to narrowed arteries, and "hardening of the arteries" (atherosclerosis).

Some people use garlic to prevent colon cancer, rectal cancer, stomach cancer, breast cancer, prostate cancer, multiple myeloma, and lung cancer. It is also used to treat prostate cancer and bladder cancer.

Ref. (Garlic Health Benefits, Garlic-Central, 2007-2014)

**Red Onion**

Red onions, are cultivars of the onion with purplish red skin and white flesh tinged with red. Red onions are available throughout the year. The red color comes from anthocyanidinssuch as cyanidin. Red onions are high inflavonoids. They can be stored 3 to 4 months at room temperature.

Ref. (Red Onion, Wikipedia)

**Palm Sugar**

Palm sugar is a nutrient-rich, low-glycemic crystalline sweetener that looks, tastes, dissolves and melts almost exactly like sugar, but it's completely natural and unrefined. It's acquired from the flowers growing high on coconut trees, which are opened to collect their liquid flower nectar. This nectar is then air-dried to form a crystalline sugar that's naturally brown in color and naturally rich in a number of key vitamins, minerals and phytonutrients, including potassium,

zinc, iron, and vitamins B1, B2, B3 and B6. (Why Organic Palm Sugar is the Next Big Thing in Natural Sweeteners by

Mike Adams, the Health Ranger, Editor of NaturalNews.com, 2010)

**Tamarind Paste**

Tamarind is a very large tree with long, heavy drooping branches, and dense foliage. Completely grown-up tree might reach up to 80 feet in height. During each season, the tree bears curved fruit pods in abundance covering all over its branches. Each pod has hard outer shell encasing deep brown soft pulp enveloping around 2-10 hard dark-brown seeds. Its pulp and seeds held together by extensive fiber network.

Ref. (Tamarind, Nutrition-and-You, 2009-2016)

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# Materials and Methods

Material

- All-purpose flour (Kit all purpose flour)
- Margarine (Imperial)
- Salt
- Sugar (Wangkanai)
- Egg (CP)
- Cold water
- Puffin margarine (Imperial)
- Vegetable oil (Naturel)
- Pad Thai sauce (Lobo)
- Garlic chives
- Tofu
- Dried shrimp
- Pickle turnip (Chada)
- Ground roasted peanuts

Equipment

- Chevron pan
- Electric stove
- Digital balance
- Oven
- Bakery utensil

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# Methodology

## I. Preliminary Test

1. Puff Pastry Dough Preparation

Table 1 Puff Pastry Dough Formula*

| Ingredients | Amount | Percentage |
|---|---|---|
| All-purpose flour | 500 gm | 100% |
| Margarine | 75 gm | 15% |
| Salt | 5 gm | 1% |
| Cold water | 250 ml | 50% |
| Puffin margarine | 300 gm | 60% |

*Source: Bakery Laboratory Biotechnology Manual

**Procedure:**

Margarine is rubbed in flour to separate shortening into pea side pieces that are coated with flour. A solution of salt in cold water is added to the flour and kneaded into dough. The dough is left to stand for 15 minutes to allow water to penetrate in the dough completely. The dough is rolled in to a rectangular sheet on a dusted table. Pastry margarine is distributed over two-thirds of the area, leaving 1 – 1.5 cm along the edge. The unlined dough sheet is folded over the margarine lined dough. Then, it is folded over the remaining dough and sealed the edge along the side. The dough is put in a flour dusted plastic bag and kept in a refrigerator for 15 minutes to firm the margarine. The cold dough is rolled and folded with 3-fold for two times and finished with 4-fold. Each folding is intervened by 15-minute refrigeration. To prepare puff pastry, the dough is sheeted to about 60×45×¼ $cm^3$ and cut to the desired dimension pieces. The filling is added in the middle, leaving enough edge for sealing. The sealed pieces are placed on a parchment lined baking sheet for 15 – 20 minutes before brushing with egg wash and baked in an oven at 200°C.

a. Discussion of puff characteristics

Thirty untrained test panelists were junior and senior students in the School of Biotechnology. They were asked to determine the characteristics of the baked puff. Adjustment of dough was done according to the comment of the untrained test panelists.

2. Pad Thai Stuffing Preparation

Table 2 Pad Thai Stuffing Formula*

| Ingredients | Amount (in grams) | Percentage (%) |
|---|---|---|
| Vegetable oil | 45 | 4.8 |
| Dry shrimp | 200 | 21.4 |
| Pickle turnip | 80 | 8.6 |
| Ground peanut | 120 | 12.8 |
| Garlic chives | 80 | 8.6 |
| Tofu | 160 | 17.1 |
| Egg | 130 | 13.9 |
| Pad Thai sauce | 120 | 12.8 |
| Total | 935 | 100 |

***Source:** www.bbcgoodfood.com/recipes/perfect-pad-thai, March 2016

Procedure:

In a pan, 2 table spoons of vegetable oil is heated at medium heat for a half minute before adding dried shrimp and egg and half of Pad Thai sauce and stirred for one minute. After the shrimp and egg are cooked, pickle turnip is added, followed by tofu and stirred to mix. The remaining ingredients and Pad Thai sauce are added and stirred till completely cooked.

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Table 3 Pad Thai sauce formula

| Ingredient | Percentage |
|---|---|
| Sugar | 30% |
| Roasted Peanut | 17% |
| Tamarind Paste | 10% |
| Shallot | 10% |
| Fish sauce | 9% |
| Tomato Paste | 8% |
| Garlic | 5% |
| Refined Soybean Oil | 5% |
| Distilled Vinegar | 4.5% |
| Salt | 1.48% |
| Chilli Oleoresin | 0.02% |

3. Pad Thai Puff Preparation

The prepared dough from (1) is rolled to about 5 mm. thick and cut into 6×9 $cm^2$ pieces and stuffed with 1 table spoon Pad Thai from (2) in the middle, folded the dough and sealed along the edge. The Pad Thai puffs are placed on a parchment lined baking sheet, leaving about 2 cm apart. Lastly, they are brushed with egg wash before baking in an oven at 180°C for 20 minutes until golden brown color is developed in the crust.

a. Discussion of Pad Thai Puff

Thirty untrained test panelists who were students in School of Biotechnology were asked to test the Pad Thai puff and provided comment on the sample.

## II. Formulation of Pad Thai Puff

1. Just-about-right Test

JAR was a test regards to six attributes level of tofu flavor, nutty flavor, sweetness, saltiness, dried shrimp flavor, garlic and chives flavor which indicated whether their respective taste was slightly strong or weak, moderately strong or weak, or just-about-right. Thirty untrained test panelists who were students in the School of Biotechnology to rate their strong to weak level of the attributes. The location of this test was at Sensory Room - 5 FL, E-Building of Assumption University. This Just-about-right test was created to find out which attribute could meet the test panelists' preference and the attributes did not meet the test panelists' preference and required further adjustment. JAR test was conducted twice.

2. Screening the Formula

Selected attributes from Just-about-right test were adjusted. Each attribute was varied at least two levels to compare with a control (non-adjusted). Each adjustment was carried twice to create two batches of sample, prepared from different times.

a. Sensory evaluation using 9-point hedonic scale preference test.

Thirty untrained test panelists included family members and employees of my father's business. They were asked to determine their preference on 6 attributes which consisted of tofu flavor, nutty flavor, sweetness, saltiness, dried shrimp flavor, garlic chives flavor.

b. Confirming test of prototype formula sensory test by using 9-point hedonic scale preference test.

Thirty untrained test panelists were used to confirm the prototype formula of Pad Thai puff.

## III. Consumer Acceptance Test

The consumer test was conducted using questionnaire with the prototype formula from 100 consumers. The consumer acceptance test was used on a large group of consumers to study

the consumers' behaviors, opinions, attitudes and their needs toward the developed Pad Thai puff. The last part was general information of consumers. The test panelists were included employees, my cousin and freshmen to senior year Biotechnology students.

## IV. Statistical Analysis

1. The Randomized Complete Block Design (RCBD) was used as the experimental design where the treatment was ingredient and preparation times were blocks.
   a. The LSD was used when the result shown that significantly difference.
2. The Microsoft Excel Program and R Program (Statistics software program version R 2.15.3) were used as the statistical analysis for analysis of variance or ANOVA at $p < 0.05$ and test treatment means.

## V. Experimentation Location

The Experimental location included E11 Bakery Lab Room, and E51 Sensory Lab Room, E-Building, Assumption University, Huamak Campus, and warehouse at Nargniwas road.

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# Result and Discussion

## I. Preliminary Test

1. Puff pastry dough preparation

The dough was prepared following the formula in Table a1. The puff dough had a good quality in a layer of puff. As a result, the puff formed many crisp layers after baking. This gave rise to the puffiness of the puff.

a. Discussion of puff pastry dough

Discussion of the puff was conducted with 30 untrained test panelists. The test panelists commented that the puff was too oily but had good crisp layers. Thus, the next study was aimed to reduce pastry margarine from 300 gm. New dough puff was prepared by reducing the pastry margarine down to 250 gm and new table was shown in Table 3.

Table 4 First adjusted Pastry Dough Formula

| **Ingredients** | **Amount** | **Percentage** |
|---|---|---|
| All-purpose flour | 500 gm | 100% |
| Margarine | 75 gm | 15% |
| Salt | 5 gm | 1% |
| Cold water | 250 ml | 50% |
| Puffin margarine | 250 gm | 50% |

2. Pad Thai Stuffing Preparation

The Pad Thai stuffing was prepared following the formula in Table a2. The Pad Thai stuffing had similar quality, proper flavor and taste as commercial Pad Thai. Thus, the formula was suitable to be used in the project.

a. Discussion of Pad Thai Puff

As the result from discussion of the Pad Thai puff, 75% of the test panelists gave the comments that the finished puff was too oily. It could be that there was oil in the Pad Thai formula and Pad Thai sauce. Since Pad Thai required oil during stir frying to prevent sticking of the noodles and ingredients on the pan, the vegetable oil could not be removed from the formula. Therefore, to solve oily of the product, the pastry margarine was decreased to 200 grams and new Table was obtained.

Table 5 Second Adjusted Pastry Dough Formula

| **Ingredients** | **Amount** | **Percentage** |
|---|---|---|
| All-purpose flour | 500 gm | 100% |
| Margarine | 75 gm | 15% |
| Salt | 5 gm | 1% |
| Cold water | 250 ml | 50% |
| Puffin margarine | 200 gm | 40% |

**II. Formulation of Pad Thai puff**

1. Just- About- Right Test

The results of Just-about-right test were used as a trend for adjustment of the Pad Thai puff. Six attributes were selected for the Just-about-right test. The attributes were related to taste and Pad Thai Puff, including sweetness, saltiness, nutty flavor, tofu flavor, dried shrimp flavor and garlic chives flavor. Thirty untrained panelists who were students and staffs in the School of Biotechnology, Assumption University and employees of private business were used as a tool in the Just-about-right test. The results as percentage of the just right level were presented in Table 6.

Table 6 Just-About-Right test results

| Attributes | Too weak | S/W too weak | Just about right | S/W too strong | Too strong | Total |
|---|---|---|---|---|---|---|
| Tofu Flavor | 6.7 | 16.7 | 73.3 | 3.3 | 0 | 100 |
| Nutty Flavor | 6.7 | 20 | 60 | 13.3 | 0 | 100 |
| Saltiness | 0 | 16.7 | 50 | 26.7 | 6.7 | 100 |
| Sweetness | 3.3 | 40 | 46.7 | 10 | 0 | 100 |
| Dry shrimp flavor | 3.3 | 30 | 26.7 | 33.3 | 6.7 | 100 |
| Garlic chives | 3.3 | 50 | 43.3 | 3.3 | 0 | 100 |

The attributes received less than 50% at the just right level were the attributes needed to adjust, other vice did not. From Table A5, tofu flavor, nutty flavor and saltiness required not adjustment. They got 73.3%, 60% and 50%, respectively. On the other hand, sweetness, dry shrimp flavor and garlic chive flavor got 46.7%, 26.7% and 43.3%, respectively which were less than 50% and needed to adjust.

Sweetness of the Pad Thai Puff had been rated at the just-about-right level by 46.7% of the test panelists. However, 40% of them stated that its sweetness was somewhat too weak, and 10% rated it as somewhat too strong. While the other 3.3% reckoned that it turned out too weak. The result indicated that the amount of sugar should be adjusted since 40% of the test panelists thought that the sweetness of Pad Thai Puff was somewhat too weak which made it very close to the percentage of the just-about-right level. It showed that the sweetness of the Pad Thai Puff should be improved to meet with the majority's satisfaction.

Dried shrimp flavor in the puff sample was rated as just-about–right by 26.7% of the test panelists. Whereas 33.3% of them stated it to be somewhat too strong and the other 30% thought otherwise saying it turned out somewhat too weak. On the contrary, 6.7% out of the test panelists rated it as too strong; while the rest

commented that it was too weak by 3.3%. In conclusion, the majority stated that the taste of dried shrimp flavor in the puff turned out slightly strong and slightly weak respectively which was higher than the percentage of just-about-right level. Therefore, dried shrimp flavored Puff can be adjusted and improved its taste further in the future.

For garlic chives flavor, 43.3% of the test panelists had rated it at the just-about-right level. 3.3% of them commented that its taste was somewhat too strong and the other 50% stated that it turned out somewhat too weak and 3.3% for too weak. In conclusion, the result indicated that more than half of the test panelists thought that garlic chive flavor was too weak. It was well showed that garlic chives flavor puff should be adjusted to make it a unique taste.

From Table 6, the tofu flavor in the puff sample was rated as just-about-right by 73.3% of the test panelists, whereas 3.3% thought that it was somewhat too strong and 16.66% stated that it turned out somewhat too weak. And the least about 6.7% rated it as too weak. Therefore, nearly ¾ of the test panelists rated it as just-about-right, the tofu flavor of the Pad Thai Puff was considered at the right level.

The nutty flavor in the puff sample was rated as just-about-right by 60% of the test panelists. On the contrary, 13.3% of the test panelists reckoned that the taste was somewhat strong, and the other 20% thought that it turned out to be somewhat too weak. Lastly, 6.7% of the test panelists rated it as too weak. As the conclusion, it showed that the majority by almost ¾ of the test panelists rated it as just-about-right. The nutty flavor of the Pad Thai Puff was considered at the right level.

Saltiness of the Pad Thai Puff was rated as just-about-right by 50% of the test panelists. On the other hand, 26.7% of the test panelists said otherwise that the taste was somewhat too strong and 16.7% thought that it turned out to be somewhat too weak. And the other 6.7% of the test panelists stated that it was too strong. In conclusion, half of the test panelists rated it as just-about-right. Saltiness of the Pad Thai Puff was considered at the right level.

2. **Screening the formula**

From the result of just-about-right test (II.1), three attributes of Pad Thai Puff needed to adjust were sweetness, dry shrimp and garlic chives. Screening of the formula by varying the ingredient that influenced the result was carried out. The samples with varying ingredients were compared with control (non-adjusted). Each screening was carried twice to create blocks of preparation. Sensory evaluation with 9-point hedonic scale preference test was used to determine significant different samples.

2.1 Sweetness

The amount of sugar was varied at 2 levels by increasing the amount of sugar in the Pad Thai sauce (120 gm) by

Control – 36 gm sugar

Treatment A increasing sugar 10% of sauce or 36% (48gm)

Treatment B increasing sugar 20% of sauce or 41.3 %( 60gm)

Three Pad Thai puff samples were prepared and tested with 30 untrained test panelists in a 9-point hedonic scale preference test. Six attributes were studied that included tofu flavor, nutty flavor, saltiness, sweetness, dry shrimp flavor, garlic chives flavor. The experiment was repeated with the same treatments. The result of average preference scores from three treatments were shown in Table 7.

Table 7 Average preference scores ± SD of Pad Thai Puff varying sugar at two levels compared to control

| Attributes | Average score ± SD of Pad Thai Puff | | |
|---|---|---|---|
| | Control (36g) | Treatment A (48 g) | Treatment B (60 g) |
| Tofu Flavor | 7±0.9 | 6.9±1.0 | 6.9±1.0 |
| Nutty Flavor | 7.6±1.2 | 7.7±1.0 | 7.5±1.2 |
| Saltiness | $7.3\pm0.9^{a}$ | $7.5\pm0.9^{a}$ | $6.9\pm1.0^{b}$ |
| Sweetness | $6.3\pm0.8^{b}$ | $7.2\pm0.8^{a}$ | $6.2\pm0.8^{b}$ |
| Dry Shrimp Flavor | 7.9±0.9 | 7.8±1.0 | 7.8±0.8 |
| Garlic chives Flavor | 7.7±1.1 | 7.7±1.0 | 7.4±1.4 |

Note: Treatments with different superscripted letters were significantly different at $p \leq 0.05$

Increasing the amount of sugar in the Pad Thai sauce affected two attributes – sweetness and saltiness as salt and sugar had synergistic effect. There were no significant differences at $p \leq 0.05$ in the preference scores from tofu flavor, nutty flavor, and garlic chive flavor. Tofu flavor obtained preference scores from 6.9 to 7.1 in a moderately like level. Nutty flavor got the preference scores of 7.5 to 7.7, more than moderately like but not very much like. Garlic chive flavor had 7.4 to 7.7 in preference scores, in moderately like.

Sweetness and saltiness showed significantly different preference scores from the treatment. For saltiness Treatment A containing 48 gm sugar, obtained score of 7.5, was significantly different from Treatment B containing 60 gm sugar of 6.9 but no significantly different from the control that contained 36 gm sugar of 7.3.

On the other hand, sweetness of Treatment A, 7.2 was significantly different from the control, 6.3 and Treatment B, 6.2 at $p \leq 0.05$. Mean scores of control and Treatment B were not significantly different. The result indicated that at 48gm

sugar in the Pad Thai sauce was preferred at moderately like level while control and Treatment B were slightly liked by the test panelists. Thus, Treatment A with 48 gm sugar was selected for further study.

2.2 Dry shrimp flavor

From just about right test, dry shrimp flavor were rated either somewhat too weak or somewhat too strong. The dry shrimp was adjusted in both increasing 10% and decreasing 10% from the control.

Control – 200 gm dry shrimp

Treatment C – 180 gm dry shrimp

Treatment D – 220 gm dry shrimp

Three Pad Thai puff samples were prepared and tested with 30 untrained test panelists in a 9-point hedonic scale preference test. Six attributes were studied that included tofu flavor, nutty flavor, saltiness, sweetness, dry shrimp flavor, garlic chives flavor. The experiment was repeated with the same treatments. The result of average preference scores from three treatments were shown in Table 8.

Table 8 Average preference scores ± SD of Pad Thai Puff varying dry shrimp at two levels compared to control

| Attributes | Average score ± SD of Pad Thai Puff | | |
|---|---|---|---|
| | Treatment C (180g) | Control (200g) | Treatment D (220g) |
| Tofu Flavor | 7.4±1.0 | 7.5±0.9 | 7.1±0.9 |
| Nutty Flavor | 7.8±0.8 | 8.0±0.9 | 7.9±0.8 |
| Saltiness | 7.5±1.0 | 7.6±1.0 | 7.5±1.2 |
| Sweetness | $7.3\pm1.2^{b}$ | $7.7\pm0.8^{ab}$ | $7.9\pm0.9^{a}$ |
| Dry Shrimp Flavor | $7.3\pm1.1^{b}$ | $8.1\pm0.8^{a}$ | $7.3\pm1.1^{b}$ |
| Garlic chives Flavor | $7.6\pm0.9^{a}$ | $7.4\pm1.1^{ab}$ | $7.1\pm1.0^{b}$ |

Note: Treatments with different superscripted letters were significantly different at $p \leq 0.05$

From Table 8, tofu flavor, nutty flavor and saltiness showed no significantly different preference scores from all treatments ($p \leq 0.05$). The average preference scores from three treatments on sweetness, dry shrimp flavor and garlic chive flavor were significantly different ($p \leq 0.05$).

Sweetness was rated from 7.3 to 7.9 which referred to moderately like. Treatment D, containing 220 gm dry shrimp or increased 10%, from control received significantly higher preference score, 7.9, than control, 7.7 and Treatment C, containing 180 gm or decreased 10%, from the control.

Garlic chive flavor was rated from 7.1 to 7.6, indicating moderately like. Treatment C received the highest preference score of 7.6 and was significantly different from Treatment D of 7.1 but not with control of 7.4.

Dry shrimp flavor was rated at 7.3, moderately like, and 8.1, very much like. Control received the highest preference score of 8.1 and significantly different from Treatment C and Treatment D of 7.3. As control received the highest score of 8.1, it was selected from further study.

2.3 Garlic chive flavor

From just about right test, garlic chive flavor was rated 50% somewhat too weak and 3.3% too weak. The amount of garlic chives in the formula was adjusted and tested the samples in the 9-point hedonic scale preference test using 30 untrained test panelists. The experiment was repeated twice with different batches from two preparations.

Control – 80 gm garlic chives

Treatment E – 100 gm garlic chives or 25% increase from the formula

Treatment F – 120 gm garlic chives or 50% increase from the formula

Table 9 Average preference scores ± SD of Pad Thai Puff varying garlic chives at two levels compared to control

| Attributes | Average score ± SD of Pad Thai Puff | | |
|---|---|---|---|
| | Control | Treatment E | Treatment F |
| Tofu Flavor | $7.1\pm0.8^{b}$ | $7.7\pm0.8^{a}$ | $7.3\pm0.8^{b}$ |
| Nutty Flavor | 7.5±0.8 | 7.4±1.0 | 7.4±0.9 |
| Saltiness | 7.3±0.8 | 7.5±0.8 | 7.6±0.9 |
| Sweetness | 7.4±0.9 | 7.1±0.9 | 7.2±0.9 |
| Dry Shrimp Flavor | 7.3±0.8 | 7.3±0.8 | 7.3±1.0 |
| Garlic Chive Flavor | $7.0\pm1.0^{b}$ | $7.7\pm0.7^{a}$ | $7.0\pm0.9^{b}$ |

Note: Treatments with different superscripted letters were significantly different at $p \leq 0.05$

From Table 9, it could be seen that there were two attributes had significantly different average preference scores at $p \leq 0.05$, which were tofu flavor and garlic chive flavor. The average preference scores from nutty flavor, saltiness, dry shrimp flavor and sweetness showed no significant differences.

Tofu flavor got the average preference score from 7.1 to 7.7 in moderately like level. Treatment E got the highest preference score of 7.7 which was significantly different from control and Treatment F. Garlic chive flavor also demonstrated the similar trend where Treatment E obtained the highest preference score, 7.7, and was significantly different from control and Treatment F, 7.0 both ($p \leq 0.05$). These results might imply that garlic chives and tofu flavor were correlated. As a result Treatment E containing 100 g garlic chives was selected in a prototype formula.

## II. Confirming test of prototype formula

Readjusted formula according to the result from screening test included 10% increased of the amount of sugar, no change in the amount of dried shrimp and 25% increase of garlic chives. The puff sample was tested in the 9-point hedonic scale preference test on 6 attributes to confirm preference level from the test panelists. 30 untrained test panelists were used on two repeating batches of production. The result was shown in Table 10.

Table 10 Preference score from Pad Thai Puff's prototype formula

| Attribute | Average preference score ± SD |
|---|---|
| Tofu flavor | 7.4 ± 0.7 |
| Nutty flavor | 7.9 ± 1.0 |
| Saltiness | 7.1 ± 0.7 |
| Sweetness | 7.9 ± 0.6 |
| Dry shrimp flavor | 8.0 ± 0.9 |
| Garlic chive flavor | 7.2 ± 0.9 |

Table 10 showed that the average scores of Pad Thai Puff for each attribute was higher than 7 or in the moderately like indicated that it was in acceptable range. This indicated that this formula could be used as the prototype formula.

Table 11 shows the prototype formula for puff pastry dough and Table 12 prototype formula for Pad Thai stuffing.

Table 11 Prototype formula for puff dough

| Ingredients | Amount | Percentage |
|---|---|---|
| All-purpose flour | 500 grams | 100% |
| Margarine | 75 grams | 15% |
| Egg | 65 grams | 13% |
| Salt | 5 grams | 1% |
| Cold water | 250 milliliters | 50% |
| Puffin margarine | 200 grams | 40% |

Figure1 Pad Thai Puff

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Table 12 Prototype formula for Pad Thai stuffed

| Ingredients | Amount | Percentage |
|---|---|---|
| Vegetable oil | 45 grams | 4.66% |
| Dry shrimp | 200 grams | 20.72% |
| Pickle turnip | 80 grams | 8.29% |
| Ground peanut | 120 grams | 12.44% |
| Garlic chives | 100 grams | 10.36% |
| Tofu | 160 grams | 16.6% |
| Egg | 130 grams | 10.36% |
| Sugar | 40 grams | 4.14% |
| Pad Thai sauce | 120 grams | 12.44% |
| Total | 995 grams | 100% |

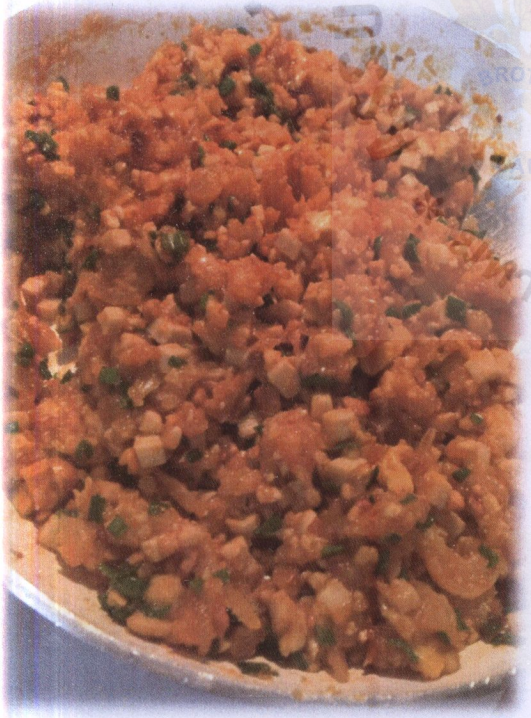

Figure 2 Pad Thai stuffing

## III. Consumer Acceptance Test

Upon achieving a satisfactory product, a consumer test was conducted to see the marketability/ preference of consumer of Pad Thai Puff product. The test panelists were normal consumers in 3 groups of people – students/staffs of Faculty of Biotechnology, members of my family/cousins and the employees of my parents business.

### A. Consumers' Behavior

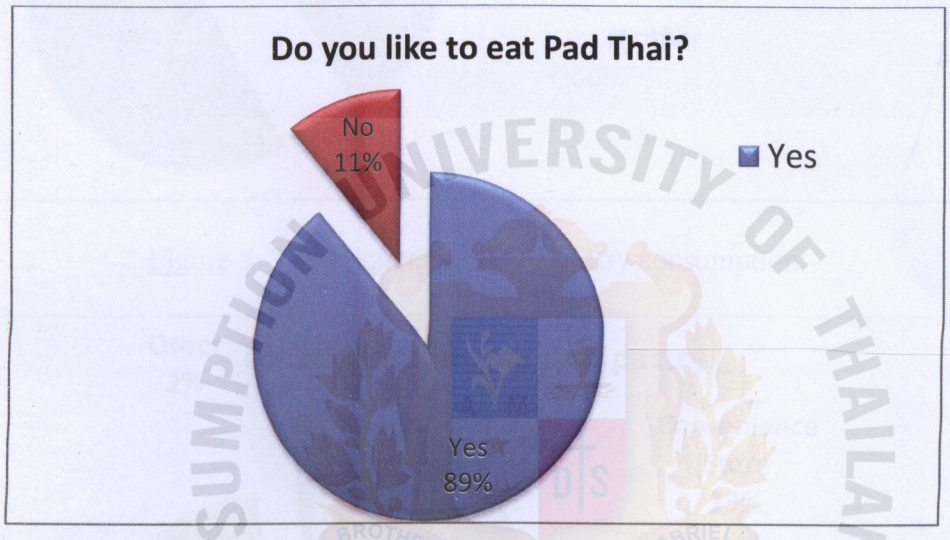


Figure 3: The percentage of people who like to consume puff pastry (puff layered)

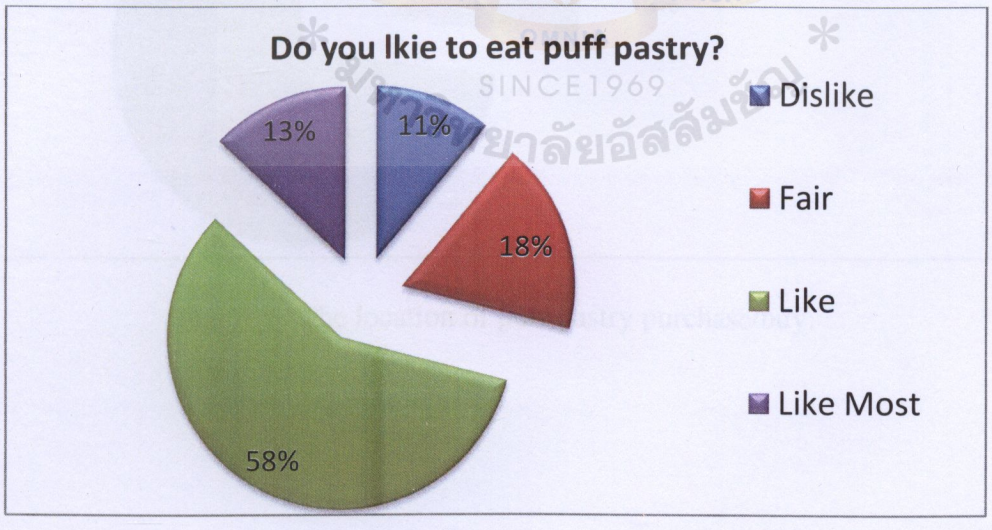


Figure 4: The Liking of Puff Pastry Consumption

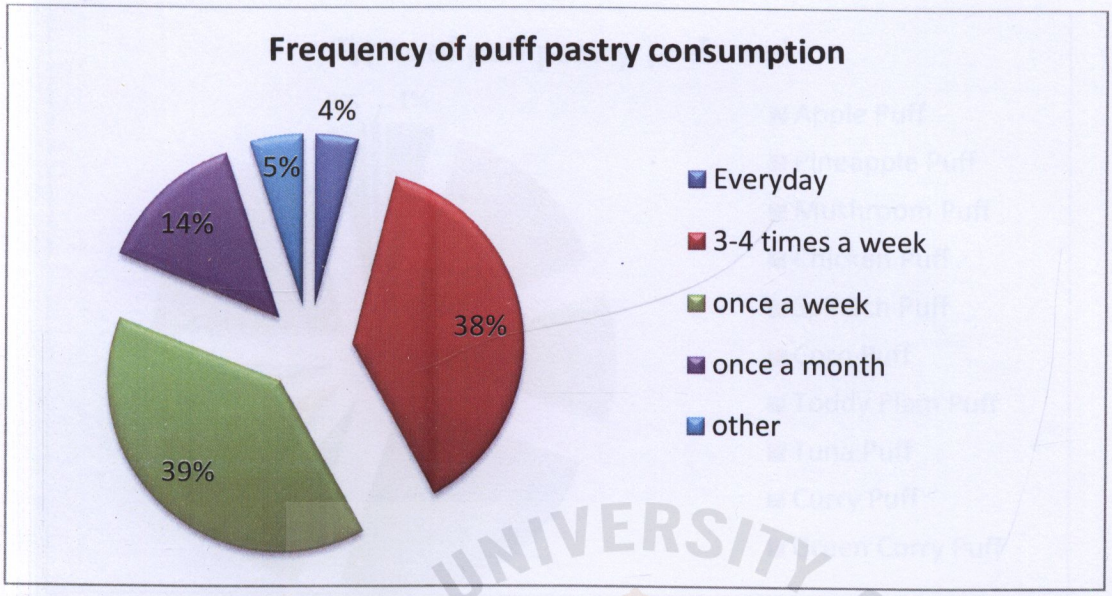


Figure 5: The frequency of puff pastry consumption.

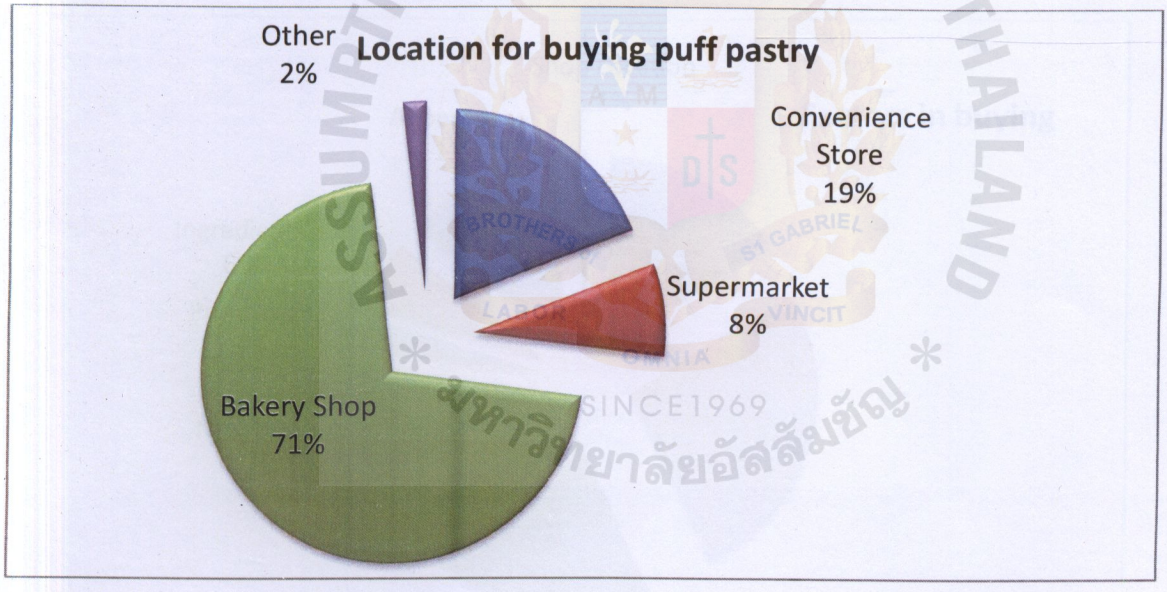


Figure 6: The location of puff pastry purchase/buy.

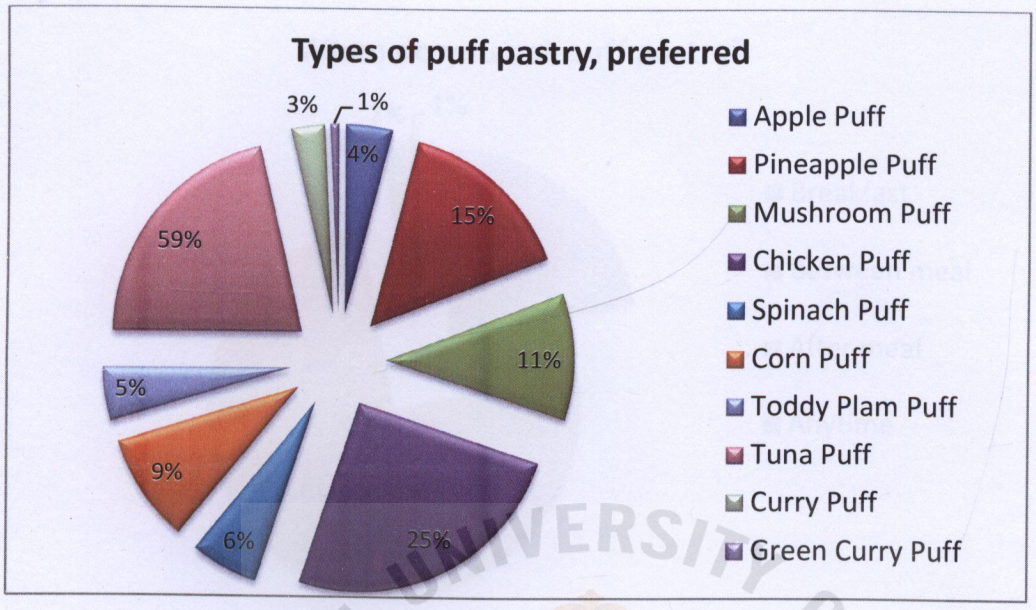


Figure 7: The kinds of puff pastry consumption.

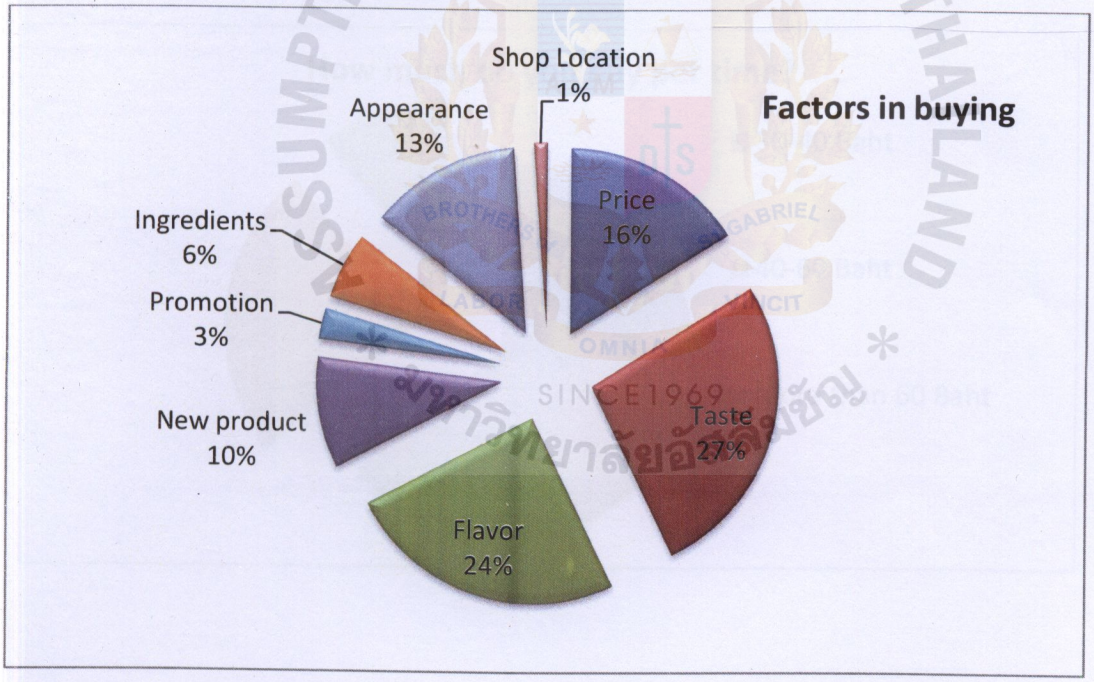


Figure 8: The factors to purchase puff pastry product.

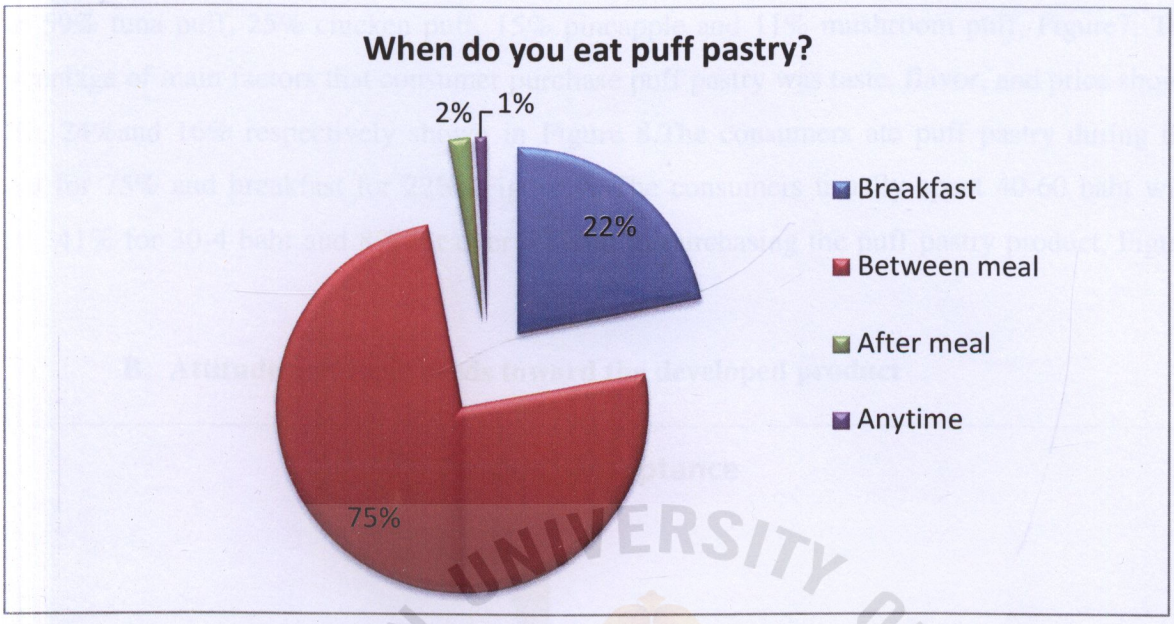


Figure 9: The period of time for puff pastry consumption

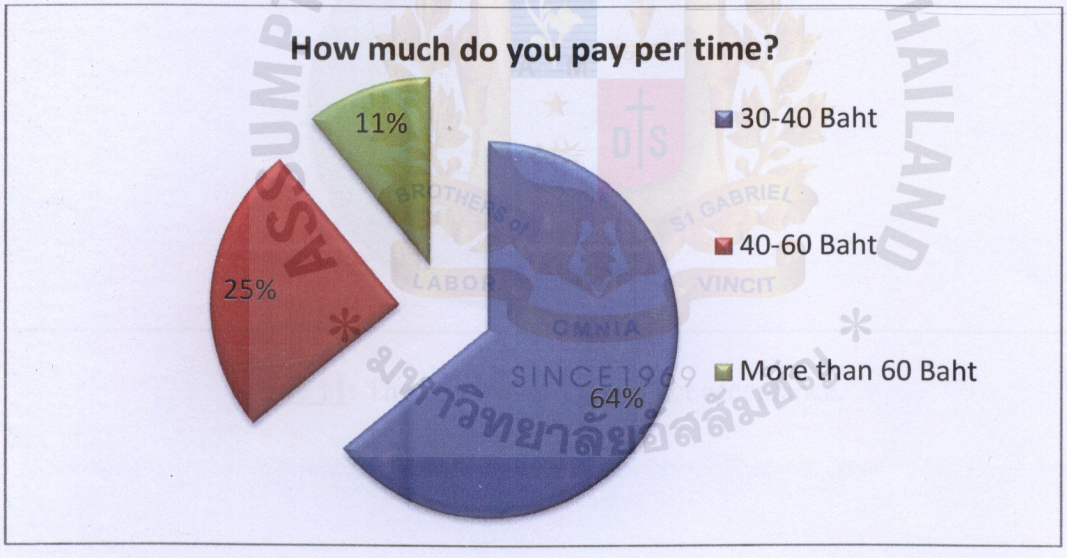


Figure 10: The cost that people usually spend money per time to buy puff pastry

One hundred consumers participated in the consumer acceptance survey. 89% of the consumer liked to eat Pad Thai and 71% like to eat puff, Figure 3 and Figure 4. For frequency of eating puff pastry, 38% ate it 3 – 4 times a week and 39% for once a week, Figure 5. They bought puff pastry in a bakery shop for 71%, Figure 6. The kinds of puff most popular among the consumers

was 59% tuna puff, 25% chicken puff, 15% pineapple and 11% mushroom puff, Figure7. The percentage of main factors that consumer purchase puff pastry was taste, flavor, and price shown 27%, 24%and 16% respectively shown in Figure 8.The consumers ate puff pastry during the meal for 75% and breakfast for 22%, Figure 9. The consumers usually spent 40-60 baht with 51%, 41% for 30-4 baht and 8% for over 60 baht in purchasing the puff pastry product, Figure 10.

**B. Attitude and their needs toward the developed product**

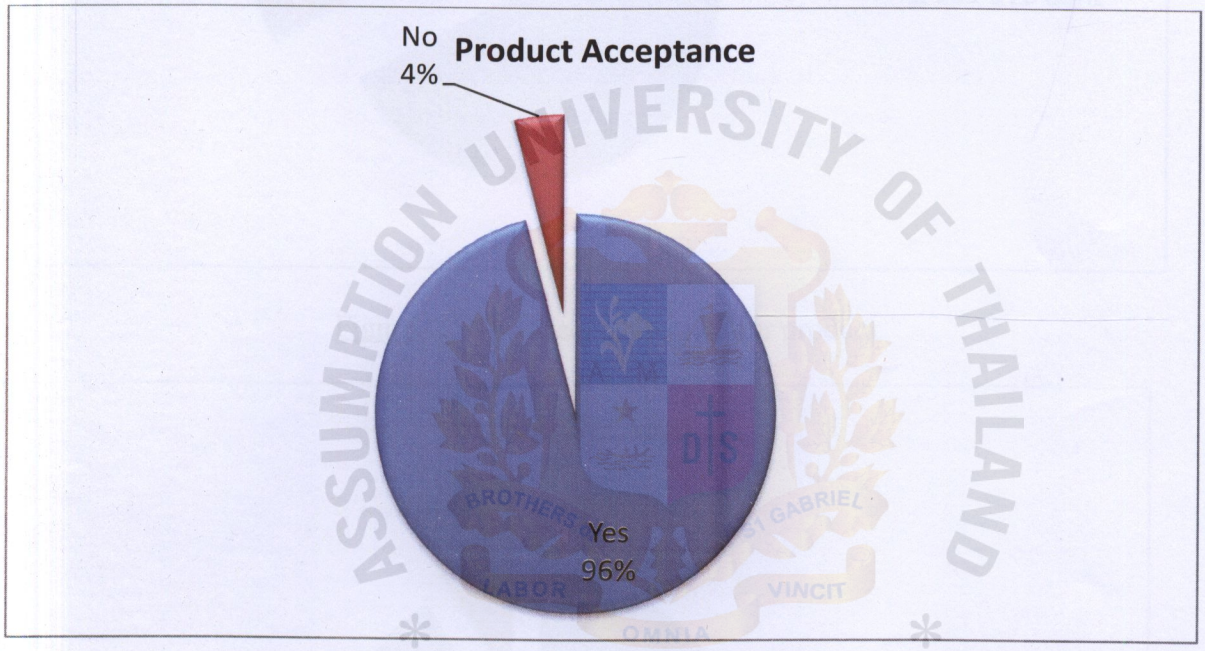


Figure 11: The percentage of product acceptance.

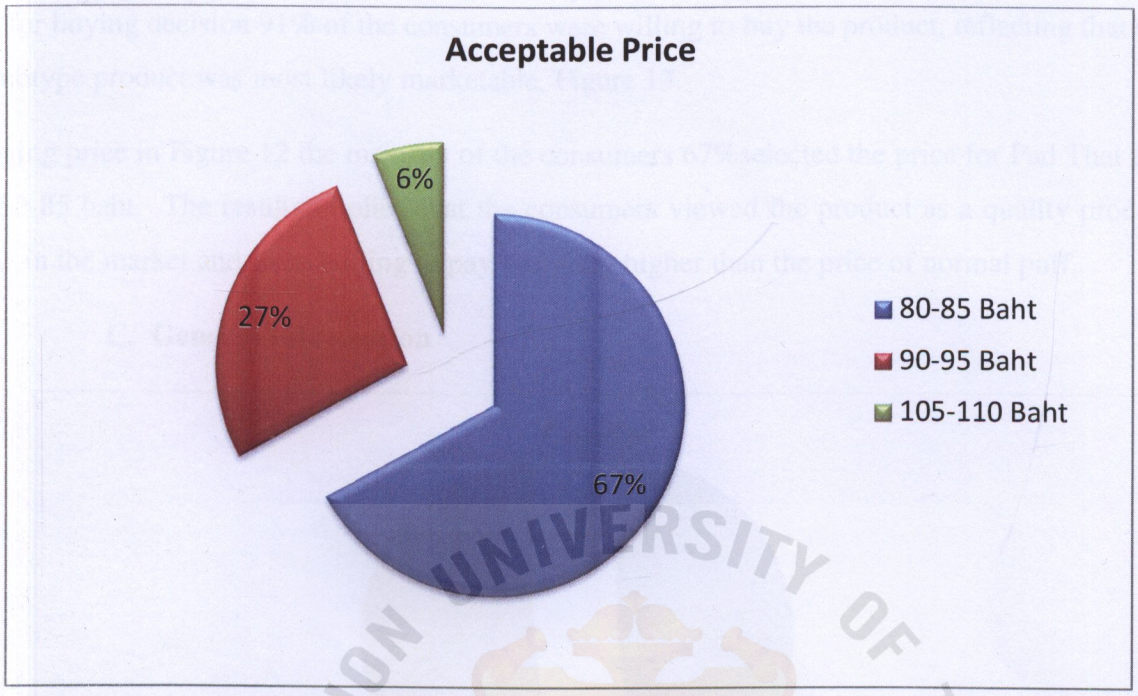


Figure 12: The acceptable price for product

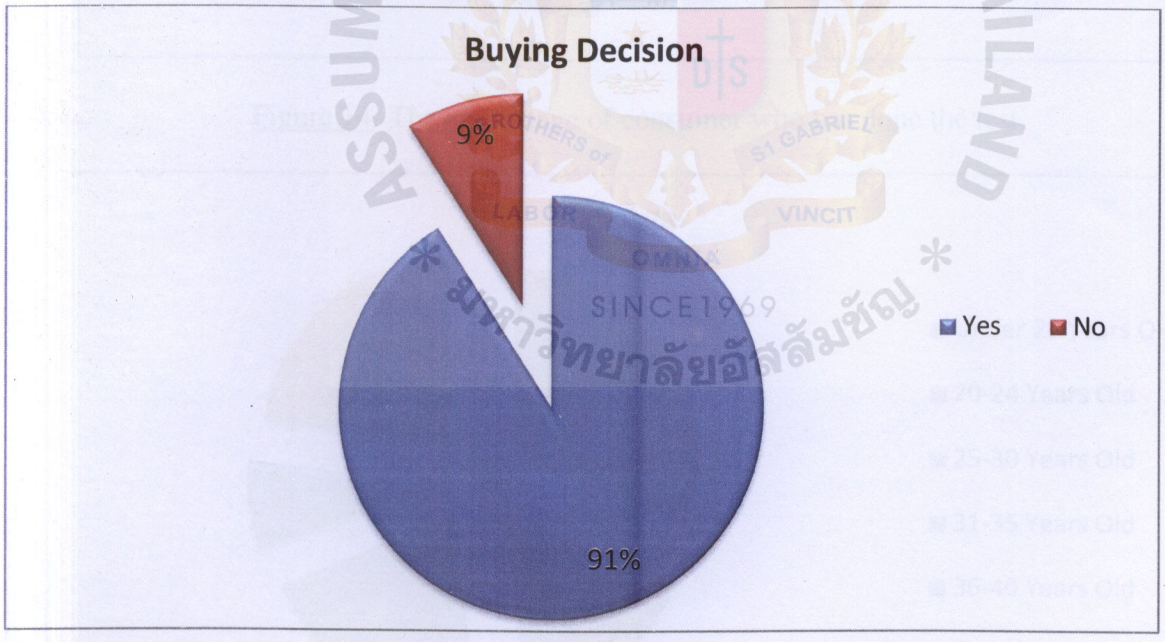


Figure 13: The product buying decision

From Figure 11 demonstrated the result from the product acceptance and it was found that 96%of the consumers accepted the product while only 4% not accept the product. With the result, therefore, the prototype product would likely to be success in the market.

As for buying decision 91% of the consumers were willing to buy the product, reflecting that the prototype product was most likely marketable, Figure 13.

Buying price in Figure 12 the majority of the consumers 67%selected the price for Pad Thai puff at 80-85 baht. The results implied that the consumers viewed the product as a quality product, new in the market and were willing to pay a slightly higher than the price of normal puff.

### C. General Information

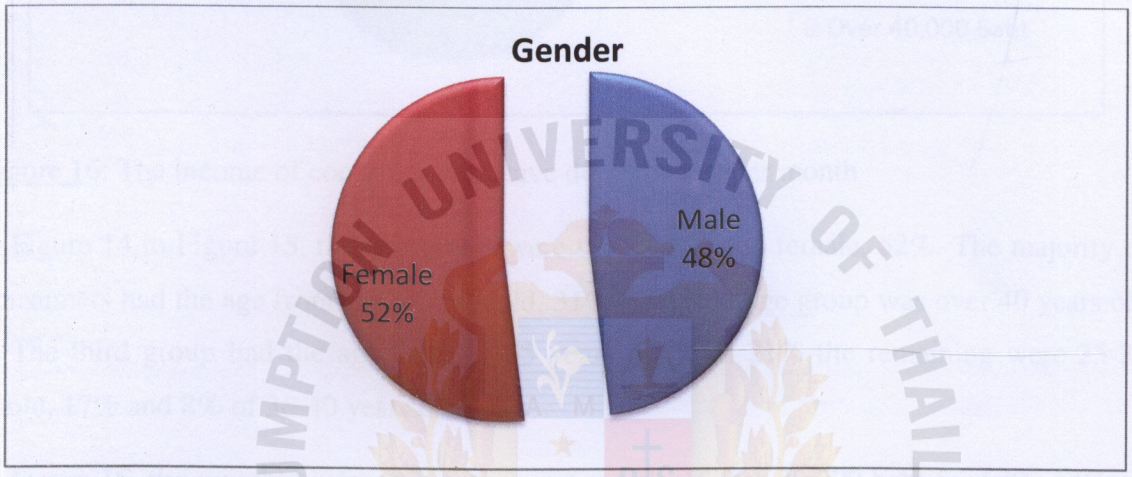


Figure 14: The percentage of consumer who has done the test.

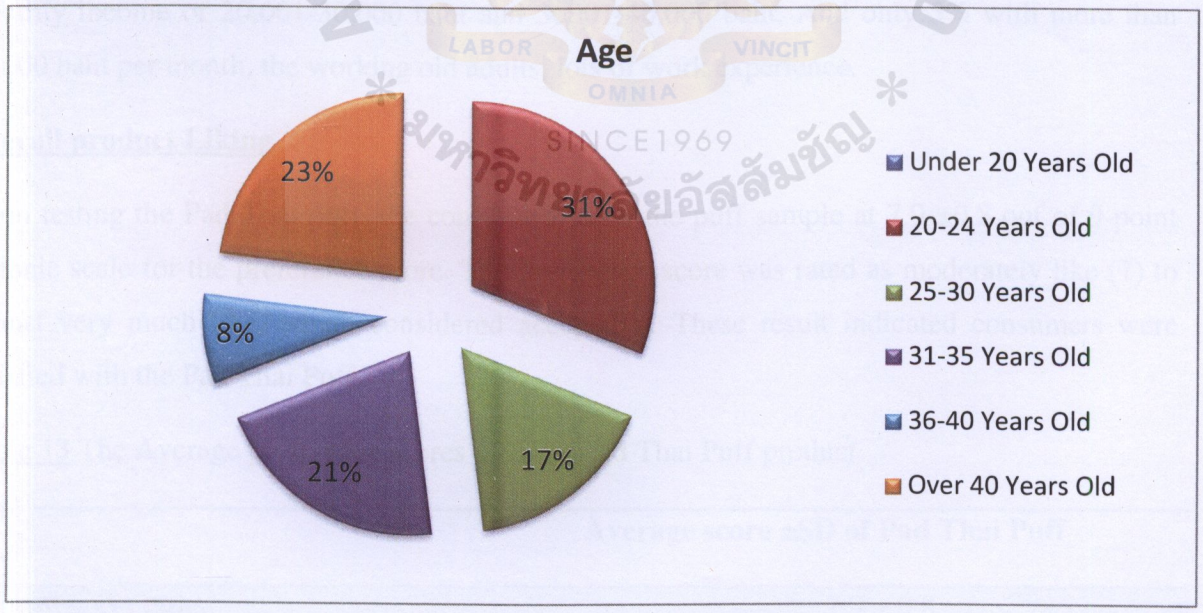


Figure 15: The age of consumer who have done the test.

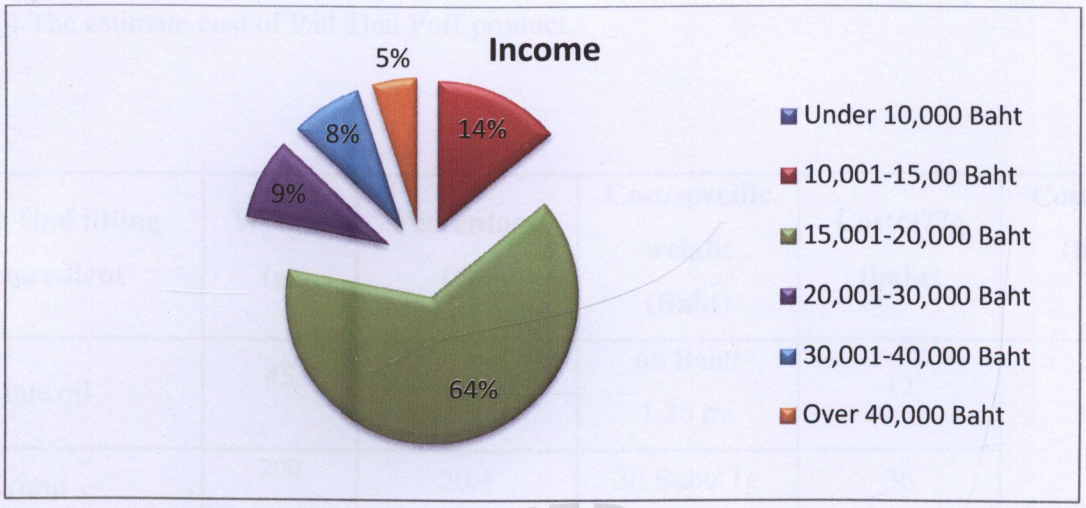


Figure 16: The income of consumer who have done the test per month

From Figure 14 to Figure 15, the consumers were male, 48% and female, 52%. The majority of the consumers had the age from 20-24 years old, 31%. The next age group was over 40 years old 23%. The third group had the age from 31-35 years old with 21% the remaining were 25-30 years old, 17% and 8% of 36-40 years old.

From Figure 16, the monthly income of them were mostly 15,001-20,000 baht for 64%, 14%per monthly income of 10,001-15,000 baht for most students. For working adult 9%, 8% had monthly income of 20,001-30,000 baht and 30001-40,000 baht. And only 5% with more than 40,000 baht per month, the working old adults, lots of work experience.

**Overall product Liking**

Upon testing the Pad Thai puff, the consumers rated the puff sample at 7.9 ±0.8 out of 9-point hedonic scale for the preference score. The preference score was rated as moderately like (7) to almost very much like, which considered acceptable. These result indicated consumers were satisfied with the Pad Thai Puff.

Table 13 The Average preference scores ± SD of Pad Thai Puff product

| | Average score ±SD of Pad Thai Puff |
|---|---|
| Overall acceptance | 7.9 ± 0.8 |

Table 14 The estimate cost of Pad Thai Puff product.

| **Pad Thai filling ingredient** | **Weight (g)** | **Percentage (%)** | **Cost/specific weight (Baht)** | **Cost/977g (baht)** | **Cost/batch (baht)** |
|---|---|---|---|---|---|
| Vegetable oil | 45 | 4.6 | 65 Baht/ 1.25 ml | 12 | 268.12 |
| Dry shrimp | 200 | 20.4 | 30 Baht/ 1g | 36 | |
| Pickle turnip | 80 | 8.18 | 18 Baht/200g | 7.2 | |
| Ground peanut | 120 | 12.28 | 65 Baht/kg | 78 | |
| Garlic chives | 80 | 8.18 | 7Baht/g | 42 | |
| Tofu | 160 | 16.37 | 24Baht/80gm | 48 | |
| Egg | 130 | 13.3 | 52 | 8.6 | |
| Pad Thai sauce | 120 | 12.28 | 32Baht/120gm | 32 | |
| sugar | 12 | 1.22 | 36baht/kg | 4.32 | |
| **Total** | **977** | **100** | | | |
| **Puff Ingredients** | **Weight** | **Percentage, fwb** | **Cost/kg (baht)** | **Cost/1080g (baht)** | **Cost/batch[a] (baht)** |
| All-purpose flour | 500 | 100 | 33 | 16.5 | 25.6 |
| Salted butter | 75 | 15 | 172 | 12.9 | |
| Puff pastry margarine | 250 | 50 | 80 | 20 | |
| Salt | 5 | 1 | 12 | 0.06 | |
| Cold water | 250 | 50 | 6.8 | 1.7 | |
| Total | 1080 | 216 | 303.8 | 51.16 | |

| | |
|---|---|
| Total raw materials cost/batch (24 pcs.) | 268.12 |
| Total raw materials cost/batch (1 piece) | 11.17 |
| Production cost 20% of total raw materials cost (1 piece) | 2.2 |
| Promotion cost 20% (top-up) of total raw materials cost (1 piece) | 2.2 |
| Total cost of Pad Thai puff pastry (1 piece) | 15.5 |
| Total cost for 5 pieces | 77.5 |
| Profit for 5 pieces from selling price at 80-85 Baht, respectively | 2.5– 7.5 |
| Percentage of profit selling price at 80-85 Baht (5 pieces), respectively | 65.6% - 98.7% |

Note: a Batch is divided by 2 from 1080g.

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# Conclusion

From this project, what we received was the results of the best flavors of Pad Thai which have the most satisfactory feedback amongst the Puff Products. The final prototypes are mentioned as follow:

For puff dough, the result showed that should reduce the amount of puffin margarine from 300 grams (original formula) to 200 grams in order to receive a good feedback from consumers. For Pad Thai stuffing, the amount of sugar should be added by 10% of original formula, garlic chive is required to be added by 25% of original formula. Other attributes use the same formula as original. The results stated in the Consumer Acceptance Test and 9-Point Hedonic Scale Test. Overall liking =_7.9 ± 0.8_which is referred to preference of consumers that is either satisfactory or moderate. As a result, 96% of panelists accepted the Pad Thai Puff product, 91% of panelists would decide to buy the product if it has been distributed in the market and 67% of panelists could afford the price by 80-85 Baht in order to buy 5 pieces of Pad Thai Puff(1 package).

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## Reference


- http://www.bbcgoodfood.com/recipes/perfect-pad-thai
- http://n121adserv.com/ads?key=2e0475c96ac834a20fca911d69346a41&width=0&height=0&ch=10020_www.oknation.net
- (Thai: ผัดไทย, RTGS: phat thai, ISO phạdịthy, pronounced [pʰàt tʰāj] ( listen), "fried Thai style") is a stir-fried rice noodle dish commonly served as a street food and at casual local eateries inThailand. It is made with soaked dried rice noodles, which are stir-fried with eggs and chopped firm tofu, and flavored with tamarind pulp, fish sauce (*nampla* น้ำปลา), dried shrimp, garlic or shallots, red chili pepper and palm sugar, and served with lime wedges and often chopped roast peanuts.[1] It may also contain other vegetables like bean sprouts, garlic chives, coriander leaves, pickled radishes or turnips (*hua chaipo* หัวไชโป๊), and raw banana flowers. It may also contain fresh shrimp, crab, squid, chicken
- http://www.templeofthai.com/cooking/about_pad_thai.php


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# Appendix A:

# Questionnaire

ASSUMPTION UNIVERSITY OF THAILAND
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มหาวิทยาลัยอัสสัมชัญ

Just-About-Right Test

Name.....Date.....

Product: Pad-Thai Puff

*Please test the given sample and rate attributes according to the intensity of the product.*

| Rate/Attributes | Too little | Somewhat Too little | Just right | Somewhat Too much | Too much |
|---|---|---|---|---|---|
| Tofu flavor | | | | | |
| Nutty flavor | | | | | |
| Saltiness | | | | | |
| Sweetness | | | | | |
| Dry shrimp Flavor & aroma | | | | | |
| Garlic chives aroma | | | | | |

Comment/Suggestion

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Adjustment of Pad Thai Puff

Type of product: Pad Thai Puff

Name:..... ..... .....Date.....

***Instruction: please test the sample and rate the sample base on your preference on a 9-point hedonic scale.**

***Please rinse your mouth before testing.**

1-Extremly dislike 4-Slightly dislikes 7-Moderately like

2-Dislike very much 5-Neither like nor dislike 8-Like very much

3-Moderately dislike 6-Slightly like 9-Extremely like

| Attribute | Sample no. ..... | Sample no..... | Sample no..... |
|---|---|---|---|
| Tofu flavor | | | |
| Nutty flavor | | | |
| Saltiness | | | |
| Sweetness | | | |
| Dry shrimp flavor | | | |
| Garlic chives flavor | | | |
| Overall liking | | | |

Suggestions/ Comment

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Confirmation Test

Type of product: Pad Thai Puff

Name:..... .....Date:.....

***Instruction: please test the sample and rate the sample base on your preference on a 9-point hedonic scale.**

***Please rinse your mouth before testing.**

1-Extremly dislike 4-Slightly dislikes 7-Moderately like

2-Dislike very much 5-Neither like nor dislike 8-Like very much

3-Moderately dislike 6-Slightly like 9-Extremely like

| Attribute | |
|---|---|
| Tofu flavor | |
| Nutty flavor | |
| Saltiness | |
| Sweetness | |
| Dry shrimp flavor | |
| Garlic chives flavor | |
| Overall liking | |

Suggestions/ Comment

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Consumer Acceptance Test

**Pad Thai Puff**

**Please kindly completely the questions below and carefully give mark √ on the answer(s) based on your opinion. Your personal data will be kept confidential. Thank you for your kind participation.**

I. Consumer's behavior

1) Do you like to consume puff pastry (puff layered)?

□Yes □No

2) How much do you like puff pastry?

□Dislike □Fair □Like □Like most

3) How frequently do you eat puff pastry?

□Every day □3-4 times a week □once a week □once a month

□other: ……..

4) Where do you usually but puff pastry products?

□Convenience shop □Supermarket □Bakery shop

□Other: ……..

5) Which kinds of puff pastry do you like most? (You can answer more than one)

□Apple puff □Pineapple puff □ Mushroom puff

□Chicken puff □Spinach puff □Corn puff

□Toddy palm puff □Tuna puff □Curry puff

□Green curry puff □Other: ……..

6) Do you think, what are the factors that you consider to buy puff pastry product?

(You can answer more than one)

□Price □Taste □Flavor

□New product □Promotion □Ingredients

□Appearance □Shop location □Other: ……..

7) When do you consume puff pastry?

□Breakfast □Between meal □After meal

□Anytime □Other: ……

8) How much do you usually spend money per time to buy puff pastry?

□30-40 Baht □40-60 Baht □More than 60 Baht

**II. Attitude and their needs towards the developed product?**

*Instruction: Please rinse your mouth with water and taste sample. Then, rate the score in the space.

| | | |
|---|---|---|
| 1-Extremly dislike | 4-Slightly dislikes | 7-Moderately like |
| 2-Dislike very much | 5-Neither like nor dislike | 8-Like very much |
| 3-Moderately dislike | 6-Slightly like | 9-Extremely like |

Overall Product liking: ……..

1) Do you accept this product, Pad Thai puff?

□Yes □No, Why ……

2) If a new product, Pad Thai puff, is launched to market, will you buy that Product?

□Yes □No, Why ……

3) Do you think what price is the most suitable for Pad Thai puff 5 pieces per bag?

□80-85 Baht □90-95 Baht □105-110 Baht

**III. General information**

Gender: □Male □Female

Age: □Under 20 years old □21-24years old

□25-30years old □30-35 years old

□36-40years old □Over 40 years old

Income:

□below 10,000 Baht □10,000-15,000 Baht

□15,001-20,000 Baht □20,001-30,000 Baht

□ 30,001-40,000 Baht □Over 40,001 Baht

***Thank you very much for your time***



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