CHAPTER IV

RESULT AND DISCUSSION

4.1. Product Result

The nutritional value of gluten free pie depends on its ingredients. Major ingredients in gluten free pie are mung bean flour and red bean flour. Mung beans (Vigna radiata) have high amount of nutrition, especially as source of plant protein. A research done by Suksesty (2017.,*in* Sari *et al*., 2020) confirms that mung bean contains 323 kcal of calorie, 22.9 g of protein, and 7.5 mg of iron per 100 g of bean.

However, nutritional value of mung bean can be varied due to different varieties, method of analysis, and growth condition. As mung beans are high in protein, therefore mung beans are rich in several amino acids, which one of them is glutamic acid. Glutamic acid is responsible to the unique taste of umami, in which umami is described as savory, meat-like taste and means 'delicious' in Japanese (Sonklin et al., 2011). Mung beans contain approximately 18.3 g of glutamic acid per 16 g of nitrogen (Dahiya et al., 2015). Therefore, mung beans are not only rich in protein, but also contributing to umami flavour for the pie.

The content of red bean flour research by Mahmud et. al., (2008) and Horbowicz, M. et. al., (2008) contains 4.00 g/100g fiber, 17.70 g/100g water, 1.10 g/100g fat, 22.10 g/100g protein, 56.20 g/100g carbohydrate, 0.012 g/100 g cyanidin, 0.024 g/100 g pelargonidin. In this product it has total 1.101 calories, 124.32 carbohydrate, 27.18 protein, 79.36 fat, 35,52 sugar, 6.6 fiber and 307.04 sodium.

4.2. Nutrition Fact

4.2.1. Nutrition Table

The nutritional value of Mung Bean flour and Red Bean flour are shown in the table 4.1 dan 4.2

Table 4. 1 Nutrition Value of Mung Bean Flour per 100 g

Nutrient content	Content
Energy (cal/100g)	72
Fiber (g/100g)	3.26
Water (g/100g)	1.81
Fat (g/100g)	0.31
Sodium (mg/100g)	15
Protein (g/100g)	4.43
Carbohydrate (g/100g)	12.79

(Adawiyah, 2010) and USDA FoodData Central, 2019

Table 4. 2 Nutrition Value of Red Bean Flour per 100 g

Nutrient content	Content
Fiber (g/100g)	4.00
Water (g/100g)	17.70
Fat (g/100g)	1.10
Protein (g/100g)	22.10
Carbohydrate (g/100g)	56.20
Cyanidin (mg/100g)	0.012
Pelargonidin (mg/100g)	0.024

(Mahmud *et.al.,* 2008) and (Horbowicz, M. *et.al.,* 2008)

4.2.2. Nutrition Calculation

Collected several data about average

Table 4. 3 Nutrition Calculation of Pie Crust

Ingredients	Calories (cal)	Carbohydrate (g)	Protein (g)	Fat (g)	Sugar (g)	Fiber (g)	Sodium (mg/100g)
Mung bean flour (40 g)		5.12	1.77	0.12		1.30	6
Red bean flour (47 g)		28	11	0.5		2	
Sugar (12 g)	46	12			11.99		
Butter (40 g)	290	0.24	0.24	32.56	0.24	0.4	240
Egg yolk (7 gr)	23	0.25	1.11	1.86	0.04		3
Water (20 ml)							
Salt (1/4 tsp)							0.04
TOTAL 8 pcs	**359**	**45.61**	**14.12**	**35.04**	**12.27**	**3.7**	**249.04**
Total /pcs	**44.87**	**5.7**	**1.76**	**4.38**	**1.53**	**0.46**	**31.13**
Total /box	**179.5**	**22.8**	**7.06**	**17.52**	**6.13**	**1.85**	**124.52**

Table 4. 4 Nutrition Calculation of Pie Filling

Ingredients	Calories (cal)	Carbohydrate (g)	Protein (g)	Fat (g)	Sugar (g)	Fiber (g)	Sodium (mg/100g)
Milk (125 ml)	75	6	4	4	5	1	28
Sugar (15 g)	58	15			14.99		
Cornstarch (10 g)	38	9.13	0.03	0.01		0.1	1
Whipped cream (100 ml)	335	3.1	2.4	35.5	3.1		27
Vanilla bean (1/4 tsp)	1	0.06			0.06		
Egg yolk (1 egg)	55	0.61	2.7	4.51	0.1		8
Longan (300 g)	180	45.42	3.93	0.3		3.3	
TOTAL 15 pcs	**742**	**78.71**	**13.06**	**44.32**	**23.25**	**4.4**	**64**
Total /pcs	**49.46**	**5.28**	**0.87**	**2.95**	**1.55**	**0.29**	**4.27**
Total 4 pcs	**197.86**	**20.99**	**3.48**	**11.82**	**6.2**	**1.17**	**17.1**

4.2.3. Nutrition Label

Nutrition Facts

4 servings per container

Serving size **2 (56g)**

Amount Per Serving

Calories **90**

	% Daily Value*
Total Fat 7g	**9%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Sodium 35mg	**2%**
Total Carbohydrate 11g	**4%**
Dietary Fiber < 1g	**3%**
Total Sugars 0g	
Includes 0g Added Sugars	**0%**
Protein 3g	**6%**

Not a significant source of cholesterol, vitamin D, calcium, iron, and potassium

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Figure 4. 1 Nutrition Fact of Gluten Free Pie

4.3. Food Safety and Packaging

4.3.1. Processing and Storage Temperature

The pie production consists of a number of unit operations that are sequenced in a certain order. The operating unit starts from making pie crust (mixing, folding, crushing, forming, and baking) the second process is making diplomat cream as pie filling (boiling, mixing, tempering, cooling, and mixing again). In order for the team to be able to proceed further, each operating unit has its own objectives.

The manufacture process for making a pie crust begins by mixing dry and fat ingredients, followed by adding liquid to mix until it

becomes a dough which is shaped according to the shape of the mold while baking in the oven. This baking process should not be too long and not too fast, it must be precise because it will affect the texture and color of the pie crust. Baking for too long will cause the texture will be too hard and brittle, as well as the color will be too brown like burnt. If it is too fast, the pie crust will give a very strong taste of red bean and mung bean. Several journals mention the pie crust baking process at a temperature of 160-175°C, for example as stated by Vicilia (2017), baking a pie crust lasts for ± 25 minutes at a temperature of 170°C. The color of the milk pie crust will change to brown during the baking process. Color has a great role on consumers' expectations, and naturalness is generally considered as a key attribute behind food choices research by Hidas et. al., (2020).

The process of making diplomat cream starts with boiling milk and vanilla bean, mixing egg yolks, sugar and corn starch, tempering, cooling, and mixing the mixture that has been cooked and cooled with heavy whipped cream.

4.3.2. Shelf Life

Pie can be stored in chiller for about 4 to 6 days, and no more than 1 day in room temperature. However, if placed in a container that is not tightly packed, the texture of the pie may become harder. Because the filling contains liquid that may cause mould to form on the pie skin because it is moist. It is recommended to consume as soon as possible or within 4 days from the date of production.

4.3.3. Product Packing

According to Kotler and Armstrong (2012., in Rahmawaty et al., 2021) "packaging involves designing and producing the container or wrapper for a product" that packaging involves a process of activities starting from production, which is used as design protection. A number of factors, including safety considerations, aesthetics, ergonomics and so on, must be taken into consideration when designing the packaging and making it available as much as possible in the market. It is different to handle every material, but in general they have similarities which must be considered for example their resistance to light and air so as not to become easily damaged. Most of these materials can be used, for example plastics, aluminium, storiform, glass and paperboard.

This gluten free pie uses a double package protector, where the first package is a round mica box whose function is to protect the pie from movement in an irregular direction. Because the size is very fitting, the pie will not roll anywhere and can reach the hands of consumers safely. For the second package, there is a marble box that uses thick cardboard material, the purpose of which is to simplify and protect the main package so that it is safer and can be carried anywhere with a few pieces in it.

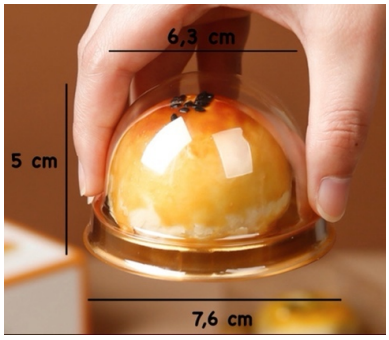

Figure 4. 2 Round Mika Box

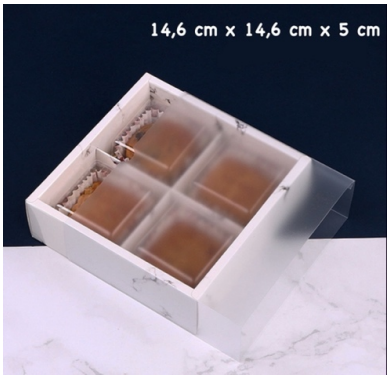

Figure 4. 3 Marble Box 4 Partition

Figure 4. 4 Logo

4.4. Financial Aspects

4.4.1. Product Cost (Variable Cost, Overhead Cost, Fixed Cost)

Product cost is calculated based on the total of all cost per month. The costs consist of labour cost, raw material cost, packaging cost, and utility cost. The labour cost is considered based on monthly working days, which are 26 days per month. As for raw material, the quantity of raw materials in counted as 20 recipes per day or 520 recipes per month, which are 40 box (160 pcs) per day or 1.040 box (4.160 pcs) per month.

1. Start-Up Capital

Table 4. 5 Start-Up Capital

Tools and Equipment	Quantity	Price (/unit)	Sub Total
Large stainless bowl	2	Rp 44.500	Rp 89.000
Measuring spoon	1	Rp 48.000	Rp 48.000
Baking tray	4	Rp 60.000	Rp 200.000
Baking paper	1 pack	Rp 11.000	Rp 11.000
Marbles	2 pack	Rp 8.500	Rp 17.000
Silicon spatula	1	Rp 13.000	Rp 13.000
Fork	1 pack	Rp 25.000	Rp 25.000
Knife	2	Rp 37.000	Rp 74.000
Cutting board	1	Rp 135.000	Rp 135.000
Mixer	1	Rp 436.000	Rp 436.000
Sauce pan	1	Rp 150.000	Rp 150.000
Rolling pin	1	Rp 25.000	Rp 25.000
Digital scale	1	Rp 75.000	Rp 75.000
Oven	1	Rp 2.151.000	Rp 2.151.000
Pie mould	5 pack	Rp 26.500	Rp 132.500
Wooden spatula	2	Rp 4.500	Rp 9.000
Measuring cup	1	Rp 17.000	Rp 17.000
TOTAL			**Rp 3.607.500**

2. Labour Cost

Table 4. 6 Labour Cost

Occupation	Personnel	Salary (/month)	Sub Total
Employee	1	Rp 1.000.000	Rp 1.000.000
Administration Officer	1	Rp 1.500.000	Rp 1.500.000
TOTAL			**Rp 2.500.000**

3. Packaging Cost

Table 4. 7 Packaging Cost

Packaging	Quantity	Price (/unit)	Sub Total
Box marble + round mika box	40	Rp 12.080	Rp 483.200
Sticker	40	Rp 15.000/20pcs	Rp 30.000
TOTAL / DAY			**Rp 513.200**
TOTAL / MONTH			**Rp 13.343.000**

4. Utility Cost

Table 4. 8 Utility Cost

Facility	Quantity	Cost / Day	Cost / Month
Water	300 ltr	Rp 3.600	Rp 93.600
Electricity	7 kWh	Rp 6.500	Rp 169.000
Gas	12kg	Rp 218.000/12kg	Rp 218.000
TOTAL			**Rp 480.600**

5. Raw Material Cost

Table 4. 9 Raw Material Cost of Pie Crust

Raw Materials	Quantity	Price (/unit)	Sub Total
Mungbean flour	40 gr	Rp 30.000/500gr	Rp 2.400
Redbean flour	47 gr	Rp 29.000/250gr	Rp 5.800
Sugar	12 gr	Rp 16.000/kg	Rp 215
Butter	40 gr	Rp 40.000/227gr	Rp 6.700
Egg yolk	7 gr	Rp 1.875/butir	Rp 772
White egg	2 g	Rp 1.875/butir	-
Water	20 ml	Rp 7.000/19ltr	Rp 8
Salt	¼ tsp	Rp 4.250/500gr	Rp 9
TOTAL (/8 pcs)			**Rp 15.904**
TOTAL (/box)			**Rp 7.952**
TOTAL (/day)			**Rp 318.080**
TOTAL (/month)			**Rp 8.270.080**

Table 4. 10 Raw Material Cost of Pie Filling

Raw Materials	Quantity	Price (/unit)	Sub Total
Milk	125 ml	Rp 18.000/ltr	Rp 1.825
Corn starch	10 gr	Rp 22.000/kg	Rp 220
Sugar	15 gr	Rp 16.000/kg	Rp 225
Whipped Cream	100 ml	Rp 55.000/ltr	Rp 5.500
Egg yolk	17 gr	Rp 1.875/butir	Rp 1.875
Vanilla bean	¼ tsp	Rp 58.000/10gr	Rp 5.800
Longan	48 gr	Rp 28.500/228gr	Rp 6.000
TOTAL (/15 portion)			**Rp 21.445**
TOTAL (/box)			**Rp 5.719**
TOTAL (/day)			**Rp 207.160**
TOTAL (/month)			**Rp 5.386.160**

Total Raw Material Cost = Rp 8.270.080 + 5.386.160
= **Rp 13.656.240**

6. Total Cost

Fixed Cost = Labour Cost

Variable Cost = Raw Material Cost, Packaging Cost, and Utility Cost

Total Cost (/month) = Labour + Raw Material + Packaging + Utility

= Rp 2.500.000 + 13.656.240 + Rp 13.343.000 + Rp 480.600

= **Rp 29.979.840**

4.4.2. Selling Price

Product Price $= \frac{Total\ Cost\ (/month)}{Total\ Product\ Units\ (/month)}$

$= \frac{Rp\ 29.979.840}{1.040}$

= **Rp 28.826,77**

= Rp 29.000

Selling Price = Rp 29.000 x 30%

= Rp 8.700 + Rp 29.000

= Rp 37.700 = **Rp 38.000**