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A Study of Consumers' Acceptance Instant Tiwul and Its Financial Analysis

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ABSTRACT

The research objective was to obtain the best proportion of the combination of gaplek (dried cassava) flour and ganyong flour (*Canna edulis*) in the production of *ganyong* instant *tiwul (granule caramelized flour)* to match with consumers' preference as well as establishing financial analysis of the product. The results show that the respondents preferred the *ganyong* instant *tiwul* of P1 treatment which was the combination of 50% of *gaplek* and 50% of *ganyong* flours. The physical and chemical qualities of P1 treatment were: water 7.01% (w/w); starch 84.42% (w/w); water activity 0.467; rehydration level 38.13%; coarse fibre 143%; and raising ability 286.183% (v/v). The results on consumers' acceptance of the raw and cooked products show that scoring on colour, texture, and flavour was between 58.01%-84.94%. This indicated that the consumers accepted the *tiwul* instant product with the additional *ganyong* flour of 50%. The cost of the instant *tiwul* production from *ganyong* flour was IDR 6,642.03/kg, resulted in the cost per pack (500 gram) of IDR 3,321.01. With the selling price of IDR 4,000.00 per pack (with 20% of mark-up), the unit BEP was 21,167 packs, while the Rupiah BEP was IDR 84,666,735.90

Keywords: instant tiwul, consumers' acceptance, financial analysis

INTRODUCTION

Ganyong *(Canna edulis Ker.)* or Queensland arrowroot is one of the high nutritious non-rice foods, especially due to its carbohydrates content which is equal to 22.6 grams per 100 grams [1]. In general, Indonesian societies still consume boiled ganyong, although it can be processed into flour and starch In the countryside, ganyong is processed into *papais* and *tiwul* [2]. Basically, Ganyong can be processed into various products such as starch, noodles, vermicelli [3] or a variety of cakes [4].

Tiwul is semi-moist food, with soft, semi-solid texture, which is the result of steaming *gaplek* flour or cassava flour that has been kneaded with water until it becomes wet and then is formed into uniform granules and steamed for 20-30 minutes. *Tiwul* can also be dried into traditional instant *tiwul* that can be preserved more than one year period [5]. However, the constraints faced by agro-industry of instant tiwul today is lacking of the availability of raw materials in the form of manioc or cassava as a lot of processed products made from the same raw materials, so manufacturers have to look after them into another areas in order to keep the production process of tiwul instant running smoothly.

Business Unit "X" located in Tawangsari village, Pujon sub-district is an agriculture business sector, which was only focused on ganyong tuber production. In 2008, the quantity of raw bulbs ganyong produced was ranged between 50-70 tons, so that it can be used as a flour substitution in the production of ganyong instant (tiwul). With the production of instant *tiwul* made of *ganyong* flour, the products manufacture by "X" business unit becomes more diverse. However, currently there is no information in term of finding the best proportion of cassava and wheat flour in order to obtain a good ganyong instant (tiwul), therefore there is a need for research to find the best proportions in the production of ganyong instant (tiwul) is necessary. Furthermore, the financial analysis is also required for producing the products under a real terms condition. Moreover, the addition or replacement of raw material cassava flour with ganyong flour in processing ganyong instant (tiwul) will affect the quality of the final product, so that products acceptance studies need to be established as the reason that the producers will recognize if the product which will be gain acceptance among the consumers.

The problem formulation of this study are: how is the proportion of *gaplek* and *ganyong* flours in the production of instant *tiwul* for obtaining a product that is acceptable by the consumers, and how is the result of financial analysis of instant *tiwul* made of *ganyong* flour?The research objective is to determine a proportion of cassava flour and starch in the production of ganyong instant (tiwul) so that products can be

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accepted by consumers as well as gaining financial analysis of the products of ganyong instant (tiwul) made of ganyong flour.

MATERIALS AND METHODS

Time and Location

The study was conducted in "X" business unit in Tawangsari Village of Pujon Sub-district, Agrochemical Technology Laboratory, Bioindustry Laboratory of Agro-Industrial Technology Department at the Faculty of Agricultural Technology, as well as Biological Sciences Laboratory of Brawijaya University in Malang in March to July 2009.

Tools and Materials

Equipment used in the study were the scales, knives, plastic tubs, boiler, tray dryer, disk mill, slicer machines, mixers, and a sieve. The materials used are ganyong tuber, cassava flour, sodium bisulfite, sugar and iodized salt.

Implementation Research

Research on the instant of flour ganyong tiwul was performed with the following steps, which are:

a. Basic studies

Baseline study was conducted to determine the content of the raw materials, processing, and analysis methods

b. Implementation of the Research and Data Analysis

Stages of the process of making flour ganyong

Stages of the process of making instant tiwul

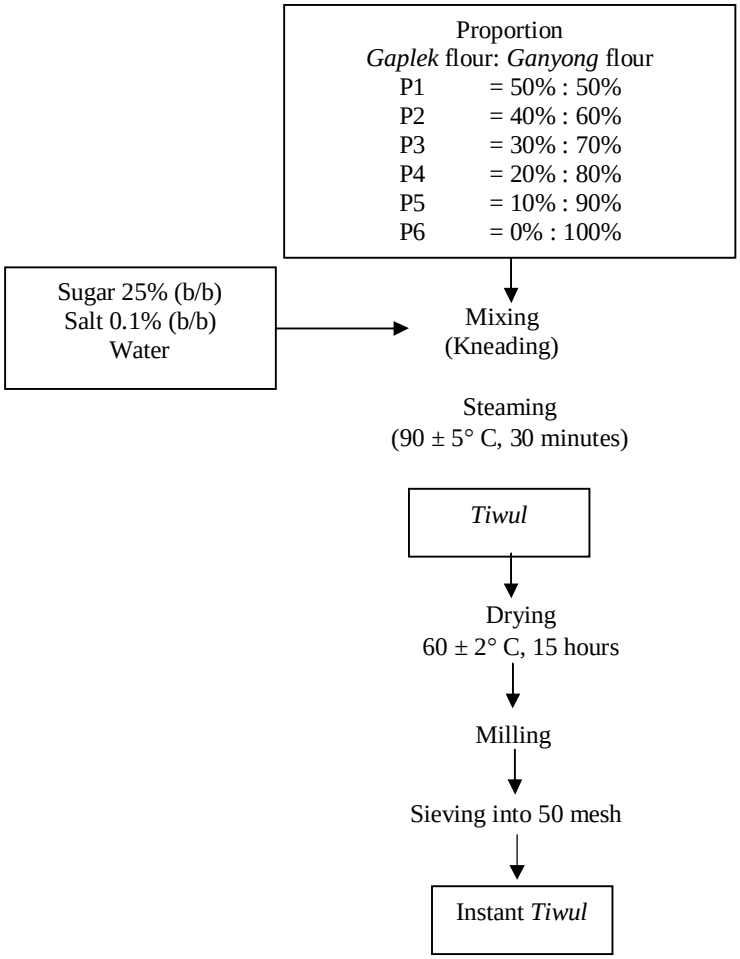

Figure 1 Flow Chart of the Making of Instant *Tiwul*

The study used the single factor Complete Randomized Design (CRD), that is, the factor of the proportion of *gaplek* and *ganyong* flours consisting of 6 levels with 5 replications.

Data obtained from organoleptic tests that include color, texture, aroma and color of raw instant tiwul, texture, aroma, flavor of mature ganyong instant (tiwul) and analyzed using the Friedman test followed by multiple comparisons with a 5% error tolerance.

a. Selection of the Best Treatment

In order to determine the best treatment combination, the study used effectiveness index of the weighting procedure. The physical and chemical parameters were grouped separately from the organoleptic parameter. In this process, the product alternative with the highest value was selected.

b. Study of the Consumers' Acceptance

The best product was presented to the consumers to perform the analysis of the consumers' acceptance. The analysis was applied on 52 randomly consumers who randomly chosen..

c. Financial Analysis

The financial analysis was performed to determine the costs to be incurred as well as the benefits to be achieved from the production of instant *tiwul* made of *ganyong* flour. The financial analysis includes calculation of the Cost of Production and *Break Even Point* (BEP).

RESULTS AND DISCUSSION

1. Results of Organoleptic Testing of Raw Instant *Tiwul*

a. Colour

The mean value of the respondents' favourite colour ranges from 3.743 (slight dislike) to 4.543 (somewhat like) and the ranking value is between 3.143 and 4.1. The lowest value was shown in the P5 treatment, while the highest in the P2 treatment (Table 1).

Table 1 Mean Scores of the Respondents' Favourite Colour of Raw Instant *Tiwul*

Treatment	Mean Score of the Respondents' Favourite
P1	4.286
P2	4.543
P3	4.057
P4	3.914
P5	3.743
P6	4.229

The value of the respondents' favourite colour of raw instant *tiwul* tends to decrease along with the addition of *ganyong* flour because of the brownish white colour of the flour. According to Mardiyansyah [6], *ganyong* flour has a whiteness value of 84.45, while based on SNI the whiteness value of flour should at least be 85. This value is related to the initial colour of the raw materials and the chemical reactions that occur. This colouring needs to be fixed in the production process.

b. Texture

The mean value of the respondents' favourite texture ranges from 3.257 (slight dislike) to 4.314 (somewhat like) and the ranking value is between 2.943 and 4.457. The lowest value was shown in the P4 treatment, while the highest in the P1 treatment. The value of the respondents' favourite texture of raw instant *tiwul* tends to decrease along with the addition of *ganyong* flour. The mean value of the respondents' favourite texture of raw instant *tiwul* can be seen in Table 2.

Table 2 Mean Scores of the Respondents' Favourite Texture of Raw Instant *Tiwul*

Treatment	Mean Score of the Respondents' Favourite
P1	4.314
P2	3.6
P3	3.6
P4	3.257
P5	3.457
P6	3.6

The texture of raw instant *tiwul* is influenced by several processes; among others are kneading, steaming, and *tiwul* milling.

c. Aroma

The mean value of the respondents' favourite aroma ranges from 3.171 (slight dislike) to 4.4 (somewhat like) and the ranking value is between 2.657 and 4.3. The lowest value was shown in the P3 treatment, while the highest in the P2 treatment. The mean value of the respondents' favourite aroma of raw instant *tiwul* can be seen in Table 3.

Table 3 Mean Scores of the Respondents' Favourite Aroma of Raw Instant *Tiwul*

Treatment	Mean Score of the Respondents' Favourite
P1	4.343
P2	4.4
P3	3.171
P4	3.771
P5	3.743
P6	3.743

The value of the respondents' favourite aroma of raw instant *tiwul* tends to decrease along with the addition of *ganyong* flour. This is because they like the aroma of the existing distinctively *gaplek*-scented instant *tiwul* better. In addition, during the making of *ganyong* flour, the materials were immersed in a sodium bisulphate solution so that the distinctive aroma of *ganyong* was overpowered by the stinging aroma of the solution.

2. Results of Organoleptic Testing of Cooked Instant *Tiwul*

a. Colour

The mean value of the respondents' favourite colour ranges from 3.714 (slight dislike) to 4.629 (somewhat like) and the ranking value is between 3.171 and 4.271. The lowest value was shown in the P5 treatment, while the highest in the P2 treatment. The mean value of the respondents' favourite colour of cooked instant *tiwul* can be seen in Table 4.

Table 4 Mean Scores of the Respondents' Favourite Colour of Cooked Instant *Tiwul*

Treatment	Mean Score of the Respondents' Favourite
P1	4.286
P2	4.629
P3	3.971
P4	3.971
P5	3.714
P6	3.971

The value of the respondents' favourite aroma of cooked instant *tiwul* tends to decrease along with the addition of *ganyong* flour. Winarno [7] states that the heating process leads to the Maillard reaction between the reductant sugar from carbohydrate and the amino acid (pimary amino group) from protein which produces a brown colour. *Gaplek* flour contains 1.398% of protein; while *ganyong* flour contains 3.847% of protein. Protein content in *ganyong* flour is higher than in *gaplek* flour, so that when more *ganyong* flour was added the colour of the instant *tiwul* would be browner.

b. Texture

The mean value of the respondents' favourite texture ranges from 3.314 (slight dislike) to 4.429 (somewhat like) and the ranking value is between 3.014 and 4.6. The lowest value was shown in the P6 treatment, while the highest in the P1 treatment. The mean value of the respondents' favourite texture of cooked instant *tiwul* can be seen in Table 5.

Table 5 Mean Scores of the Respondents' Favourite Texture of Cooked Instant *Tiwul*

Treatment	Mean Score of the Respondents' Favourite
P1	4.429
P2	3.657
P3	3.457
P4	3.486
P5	3.514
P6	3.314

The value of the respondents' favourite texture of cooked instant *tiwul* tends to decrease along with the addition of *ganyong* flour. This is so because the addition of *ganyong* flour adds to the pliancy of the cooked instant *tiwul.*

c. Aroma

The mean value of the respondents' favourite aroma ranges from 3.143 (slight dislike) to 4.429 (somewhat like) and the ranking value is between 2.657 and 4.286. The lowest value was shown in the P3 treatment, while the highest in the P2 treatment. The mean value of the respondents' favourite aroma of cooked instant *tiwul* can be seen in Table 6.

The value of the respondents' favourite texture of cooked instant *tiwul* tends to decrease along with the addition of *ganyong* flour. This is because they like the aroma of the existing distinctively *gaplek*-scented instant *tiwul* better.

Table 6 Mean Scores of the Respondents' Favourite Aroma of Cooked Instant *Tiwul*

Treatment	Mean Score of the Respondents' Favourite
P1	4.343
P2	4.429
P3	3.143
P4	3.857
P5	3.857
P6	3.571

d. Flavour

The mean value of the respondents' favourite flavour ranges from 3.343 (slight dislike) to 4.086 (somewhat like) and the ranking value is between 3.014 and 3.943. The lowest value was shown in the P3 treatment, while the highest in the P5 treatment. The mean value of the respondents' favourite flavour of cooked instant *tiwul* can be seen in Table 7.

Table 7 Mean Scores of the Respondents' Favourite Flavour of Cooked Instant *Tiwul*

Treatment	Mean Score of the Respondents' Favourite
P1	3.687
P2	3.714
P3	3.343
P4	3.514
P5	4.086
P6	3.857

The value of the respondents' favourite texture of cooked instant *tiwul* tends to increase along with the addition of *ganyong* flour. Winarno [7] states that the flavour of food can derive from the food itself, and when it has received treatment or processing the taste can be affected by substances added during processing.

Selection of the Best Treatment

Based on the organoleptic parameter, the highest assessment was given to the proportion of 50% *gaplek* flour and 50% *ganyong* flour. Based on the physical-chemical parameters, the highest assessment was given to the proportion of 0% *gaplek* flour and 100% *ganyong* flour. The organoleptic parameter was considered most important because it is closely related to the level of acceptance of a product.

Study of Consumers' Acceptance of Instant *Tiwul*

The level of consumers' acceptance of the parameters of raw instant *tiwul*: 58.01% of the consumers agreed that raw instant *tiwul* had an attractive colour; 77.88% of the consumers agreed that raw instant *tiwul* had the appropriate texture; 73.40% of the consumers agreed that raw instant *tiwul* had an appetizing aroma. The level of consumers' acceptance of the parameters of cooked instant *tiwul*: 64.74% of the consumers agreed that cooked instant *tiwul* had an attractive colour; 83.33% of the consumers agreed that cooked instant *tiwul* had the appropriate texture; 77.88% of the consumers agreed that raw instant *tiwul* had an appetizing aroma; and 84.94% of the consumers agreed that cooked instant *tiwul* tasted good.

Financial Analysis

a. The Cost of Production

The Cost of Production (COP) was calculated to determine the amount it would cost to produce each kilogram of instant *tiwul*. The COP of instant *tiwul* made of *ganyong* flour is IDR 6,642.03 per kilogram. It was planned that the product would be packaged at 500 grams, so that the COP of each pack would be IDR 3,321.01. The selling price of the instant *tiwul* was planned to be IDR 4,000.00 per pack with a profit rate or mark-up of 20%. The mark-up was determined by the amount of expected profit, the capacity of "X" business unit, and the existence of competitors on the market. Compared to the price of the instant *tiwul* available on the market, amounting from IDR 3,000.00 to 5,000.00, the price of the instant *tiwul* is within the price rance of similar products.

b. *Break Even Point* (BEP)

The calculation of *Break Even Point* (BEP) consists of rupiah BEP and unit BEP. BEP is used to calculate the amount of revenue and the number of production that experience neither profit nor loss. The unit BEP of instant *tiwul* business at the price of IDR 4,000.00 is 21,166.68 units. The planned rupiah BEP of instant *tiwul* business is IDR 84,666,735.90 which means that the business will experience the break-even at IDR 84,666,735.90.

CONCLUSION

The treatment that produces the best product was the proportion of 50% *gaplek* flour and 50% *ganyong* flour. Then, a study on the consumers' acceptance of the instant *tiwul* was conducted. The study showed that the assessment of the colour, texture, and aroma of the raw instant *tiwul* as well as that of the colour, texture, aroma, and flavour of the cooked instant *tiwul* ranges between 58.01% and 84.94%, meaning that the consumers accepted the instant *tiwul* product that received an addition of *ganyong* flour. Based on the financial analysis, COP of the *ganyong* instant *tiwul* is IDR 6,642.03 per kilogram, so that the COP per pack (500 gram) is IDR. 3,321.01. The selling price of the instant *tiwul* is IDR 4,000.00 per pack with a 20% mark-up. The unit BEP is 21,166.68 units or 21.167 packs, while the rupiah BEP is IDR 84,666,735.90.

SUGGESTION

Instant *tiwul* made of *ganyong* flour has a high Aw, low rehydration rate, low coarse fibre, and low raising ability so further research is needed to improve the physical-chemical parameters of the instant *tiwul*.

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