Quality Indexes and Feasibility Analysis of Traditional Dried Anchovy From Buru Island

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Abstract. Dried anchovy is a prominent fishery product in Buru Island Maluku. It is produce traditionally in villages Batuboi and Siahoni at Kayeli bay. Drying process was done in open air under the sun directly during two days to produce dried anchovy with a prospective marketable. This preliminary research was aimed to investigated the quality indexes and business feasibility of dried anchovy produced by processor community. The quality index was found by laboratory analysis of sample dried anchovy referring to Indonesian National Standard. The data for feasibility analysis was found by interview and by using questioner list. The average Quality indexes of dried anchovy as follows: Water 14.22 grams percent; Protein 55.68 grams percent; Fat 2.29 grams percent; Ash 9.02 grams percent; Total Bacteri (TPC) 3.5 x 10⁻²; organoleptic value 7.79; E. coli, Salmonella and Mold were unidentified. Total cost of dried anchovy production is 37,050,720 Rupiahs/year with the income was 224,000,000 Rupiahs/year. Total profit is 217,824,880 Rupiahs/year and the Revenue Cost ratio was 6.05. Dried anchovy from Buru Island has a good quality and also has a good business feasibility.

1. Introduction
Dried anchovy is a prominent fishery product in Buru Island – Maluku, among other products such as dried cucumber, dried seaweed and smoked fish. Dried anchovy is produced in Batuboi and Siahoni villages at Kayeli bay. Anchovy can be harvested throughout the year, but the highest season is twice a year on Mart-April and October-December. Bagan (floating object equipped light source to attract fish get together) placed on the water then harvesting held on it by using anchovy net at night or in the early morning. On the highest season, sometimes the fishes are unhandled and buried at the beach, thereupon should optimize the utilization of anchovy for a better business prospect and development.

The drying process held in two days (12-15 hours effective) under the sun and put on the ground based on anchovy net to produce a prospective marketable dried anchovy. So far this product is not popular yet as well as dried anchovy from Medan. Moreover the quality indexes and feasibility analysis are not explored yet. According to Indonesia National Standardization (1992), the quality indexes of dried (salted) anchovy should have minimum organoleptic value 7 without mold appearance; maximum Total Plate Count (TPC) 5.0 x 10⁵ cfu/g; Escherichia coli maximum 3 cfu/g; Salmonella, Staphylococcus aureus and Vibrio cholera are negative; water content maximum 40% and Ash (not acid soluble) maximum 0.3%.
Quality indexes and feasibility analysis are essential for its development as a superior product that will contribute to local government revenues. Based on that, this preliminary exploration study was done to investigate the quality indexes and business feasibility of dried anchovy from Buru Island.

2. Methodology

2.1. Sampling Dried Anchovy and Collecting Feasibility Data
Dried anchovy was sampling from villages Batuboi and Siahoni at the coastal of Kayeli Bay, Buru Island and brought to the industry institution of research and standardization laboratory and Fish processing Technology laboratory in Ambon for quality evaluation. Business feasibility data was got by interview 30 respondents and also by using questioner list. The respondents have a range age around 36-56 years old.

2.2. Proximate Composition Analysis
Proximate analysis were done referring to the method of Association of Officials Analytical Chemistry (AOAC, 2000). The following parameters were measured crude protein (Kjeldahl method), crude fat (Soxhlet method), moisture (thermostatically controlled forced air oven) and ash content (muffle furnace).

2.3. Organoleptic test
This test aimed to know the quality of dried anchovy by observing the appearance, smell, consistency and presence or absence of mold growth. Organoleptic test was done according to Indonesia National Standardization (1991) involved 15 panelists by using score sheet organoleptic dried (salted) anchovy with the highest scale of 9 and the lowest 1.

2.4. Microbiology Test
2.4.1. Total Plate Count (TPC), according to Indonesia National Standardization (BSN) (SNI 01-2332-3-2006). Pipetting 1 ml homogenized 25 grams dried anchovy in 225 ml Butterfield Phosphate (BFP) into a tube filled 9 ml BFP (10^{-2} dilution) then pipetting 1 ml 10^{-2} dilution into other tube filled 9 ml BFP (10^{-3} dilution) and further up to dilution 10^{-5}. Pipetting 1 ml from every dilution tube into sterilized petri-disc then 12-15 ml Plate Count Agar (PCA) (T 45°C) poured into the petri-disc then shaken generously until homogenous and let it solidified. Furthermore all of the petri-disc put into incubator (T 37°C) for 24-48 hours. Counting colony on the petri-disc with 25-250 colony.

2.4.2. Escherichia coli, According to Indonesia National Standardization (SNI 01-2332.1-2006). 1 ml dilution dried anchovy (25 g) in BFP solution (225 ml) pipetted into 3 serial tubes of LTB in Durham and incubated it (Coliform prediction). Positive LTB tube inoculated into BGLB Broth by using ose and incubated it at 35°C for 48 hours. Each positive inoculated LTB inoculated into FC Broth tube by using ose and incubated it at 45°C in the water bath for 48 hours (Coliform confirmation). Determination of fecal Coliform MPN/G based on total E. coli tube. 1 ose positive E. coli solution was took and streak on LTMB agar and incubated it at 35°C for 24 hours. More than 1 colony E. coli was took and streak on slanting PCA and incubated it at 35°C for 24 hours.

2.4.3. Salmonella sp. According to Indonesia National Standardization (SNI 01-2332-4-2006). 25 mg dried anchovy homogenized in 225 ml Lactose Broth solution for 2 minutes. 0.1 ml sample solution was moved into 10 ml RV medium and 1 ml into 10 ml TTB, whisked thoroughly and incubated it at 35°C for 24 hours. The tube vortex and took by using loop (3 mm) and streak on TTD which is incubated into HE, XLD and BSA medium. Streak into RV Broth then incubated it at 35°C for 24 hours. Two or more Salmonella colony from each selective agar took by using sterilized needle and streak TSI agar in the scraping oblique and vertically piercing firstly the streak on oblique agar. Both of TSI and LIA incubated at 35°C for 24 hours then continued with biochemistry test.
2.4.4. Mold Test, according to Indonesia National Standardization (BSN) (SNI 2332.7:2009). Pipetting 1 ml homogenized 25 grams dried anchovy in 225 ml Butterfield Phosphate (BFP) into a tube filled 9 ml BFP ($10^{-2}$ dilution) then pipetting 1 ml $10^{-2}$ dilution into other tube dilled 9 ml BFP ($10^{-3}$ dilution) and further up to dilution $10^{-3}$,15-20 ml media Potato Dextrin Agar (PDA) poured into sterilized petri-disc And let it solidified. Pipetting 0.1 ml from each dilution tube and put onto PDA and spread evenly. After 1 hour incubated PDA plate (37°C) for 5 days with the cup position upside down. Make control procedure without sample and mixing dilution solution with PCA.

3. Result and Discussion

3.1. Quality Indexes

Quality indexes of dried anchovy produced by the community from Batuboi and Siahoni villages can be seen on Table 1.

| Proximate (gam percent) | Organoleptic | Microbiology (cfu/g) |
|------------------------|--------------|---------------------|
| Protein                | 55.76        | 7.7                 | 3.5x10^2 |
| Fat                    | 2.98         | 3.6                 | Negative |
| Water content          | 14.21        | 14.22               | Negative |
| Ash                    | 9.6          | 8.44                | Negative |

Dried anchovy produced by the community in Buru Island has a good organoleptic with an average value 7.6. The growth and activity of microorganism especially putrefactive bacterial produce substances which greatly affects appearance, smell and consistency of the dried anchovy. Highly protein content on fish is very good condition for growth and activity of bacterial. Bacterial decay of macromolecule especially protein produce simple metabolism substances such as hydrogen sulfide, organic acids and ammonia are a very bad influenced on appearance, smell and consistency. The microbiology quality of dried anchovy describes a good quality of a product with a relatively small total bacterial (TPC) average 3.55 x $10^2$ cfu/g and negative Escherichia coli, Salmonella and mold. 14.2 grams percent a relatively low water content of dried anchovy creating condition that inhibits bacterial growth and activity and also mold.

According to Indonesia National Standardization (1992), the quality indexes of dried (salted) anchovy should have minimum organoleptic value 7 without mold appearance; maximum Total Plate Count (TPC) 5.0 x $10^5$ cfu/g; Escherichia coli maximum 3 cfu/g; Salmonella, Staphylococcus aureus and Vibrio cholera are negative; water content maximum 40%, the dried anchovy from Buru Island has a good quality.

3.2. Feasibility Analysis

3.2.1. Profile of Dried Anchovy Business in Buru. Dried anchovy business is a family business, managed by the family member involving 3 or 4 people with a length of time ranging from 5-10 years. They use their own money for capital venture, without supported or treated by local government or financial institution and also has not taken under legal institution. They have bagan (floating object equipped light resource for attracting fish to come and gather around it) and some of them have more than one. Bagan put on the water then catching fish on it by using anchovy net (called karoro) at night or in the early morning. The price of bagan is 20,000,000 – 25,000,000 rupiahs and the boats for fishing made of wood or fiber with or without driving machine. The highest season of catching anchovy twice a year, in Mart-April and October-December. Therefore there are 2 months effective time to catching anchovy a year and catching anchovy done 4-5 times a month during high season.

The drying process did traditionally, newest catching fish put on the ground based on anchovy net and drying under the sun for 2 days (12-15 effective hours) then winded aired under the roof and packed...
in a big plastic sack. When the season abundant coincides with the rainy day, there is a failed production where the fish are thrown into the sea or buried on the beach to avoid the stench of the untreated fish. Dried anchovy production range on 500 kg to 1 ton a week (average 700 kg/week). The selling price of dried anchovy at the Namlea market is 40,000 rupiah/kg, 55,000 rupiah/kg in Ambon and 20,000 rupiah/kg at the producer level. The merchants come to the producer every 2 weeks.

3.2.2. Distribution and Marketing of Dried Anchovy

![Marketing of Dried Anchovy in Buru](image)

**Figure 1. Marketing of Dried Anchovy in Buru**

3.2.3. Cost of Dried Anchovy Production. The cost of dried anchovy production a week can be seen on Table 2.

**Table 2. Cost of Dried Anchovy Production per week**

| Component                      | Amount (Rupiah) | Component           | Amount (Rupiah) |
|--------------------------------|-----------------|---------------------|-----------------|
| Depreciation cost of bagan     | 95,890          | Cigarette           | 50,000          |
| Repair/maintenance of bagan    | 150,000         | Fuel                | 200,000         |
| Repair/maintenance of anchovy net | 200,000       | Food                | 50,000          |
| Administration/Retribution/Task| 1,000           | Transportation      | 25,000          |
| Total                          | 446,890         | Total               | 325,000         |

The total cost a week is Rp. 771,890, therefore total cost for a month is Rp. 3,087,560 and Rp. 37,050,720 spend for a year.

3.2.4. Total Revenue of Dried Anchovy Production. The revenue is selling price of product multiplied by the amount of dried anchovy production. The average production a week is 700 kg and the selling price at Namlea market is Rp. 40,000, therefore total revenue in a week is Rp. 28,000,000. Furthermore total revenue in a month is Rp. 112,000,000. In a year, there are 2 months effective time for catching fish, so the total revenue in a year is Rp. 224,000,000.

3.2.5. Profit and Loss Analysis. This analysis aims to know the profit or the loss of business, which is a profitable venture will have a greater revenue than total cost [7].

Profit = revenue – (total fixed cost + total variable cost)

Total revenue a week is Rp. 28,000,000 and the total cost is Rp. 771,890, can be calculated the total profit is Rp. 27,228,110 a week. Therefore the total profit a month is Rp. 108,912,440 and Rp. 217,824,880 a year.
3.2.6. **Feasibility Business analysis.** This analysis is used to investigate the feasibility of a venture or a business and aims to know the profit level, return on investment or even a business break-even point. R/C analysis is used to investigate the profits relativity of the cost spend in a business. The feasibility is good when the R/C>1 [7].

Feasibility business of dried Anchovy production can be calculated by using formula Revenue Cost Ratio below:

\[
\frac{R}{C} = \frac{\text{Total Revenue}}{\text{Total Fixed Cost} + \text{Total Variable Cost}}
\]

Total revenue a year is Rp. 224,000,000 and the total fix cost plus variable cost are Rp. 37,050,720, therefore the feasibility business of dried anchovy production is 6.05. According to [7] the dried anchovy production in Buru has a good feasibility business and moreover very prospective to be developed in order to produce a featured product in Buru.

4. **Conclusion**
Dried anchovy produced by the community from Kayeli bay Buru Island has a good quality and a good feasibility business.

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